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ANTHROPOGEOGRAPHICAL INVESTIGATIONS IN BRITISH NEW GUINEA.*

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Let me, in the first place, make it clear that the Daniels Ethnographical Expedition was in no sense an exploring expedition, and the results brought before you to-night are but the geographical gleanings of an ethnographical expedition. I cannot even offer you fearsome ethnographical details of

> ". . . the cannibals that each other eat,
> The Anthropophagi, and men whose heads
> Do grow beneath their shoulders,"

though we did hear of, but unfortunately had no opportunity of personally investigating, a tribe the members of which, before sitting down, scratched a hole in the ground with their spears to accommodate their tails.

For the purely geographical observations made to the west of Port Moresby, Dr. Strong is responsible, but he did not visit the Massim district. I am indebted for a very large amount of the material I have used in that section of the paper which deals with the south-eastern extremity of the island to the organizer and chief of the expedition, Major Cooke Daniels, whom I take this opportunity of thanking for allowing me to some extent to anticipate his results. My best thanks are also due to Captain Pim, who made the plan of Tokunu and Gawa and the sections of the islands of the Marshall Bennet group which are reproduced in this paper, and whose description of Kwaiawata I have quoted almost verbatim.

* Read at the Royal Geographical Society, December 18, 1905. Map, p. 324.

Thus, while I have not hesitated to draw on my colleagues for material, the responsibility for its presentation and for any inferences drawn from it must rest on myself.

Dr. John E. Marr and Messrs. W. G. Fearnsides and H. Woods have very kindly examined and identified the rocks and fossils mentioned in this paper, and to them my best thanks are due for enabling me to give a more coherent account of the districts visited than would have been possible otherwise. The majority of the photographs were taken by my colleague, Mr. A. H. Dunning.

The districts it is proposed to discuss to-night are three in number, viz.—

(1) British New Guinea, west of Bugi, *i.e.* the extreme west of the possession between Strachan island and the Anglo-Dutch boundary.

(2) The valley of the St. Joseph river and its neighbourhood, situated some 60 miles to the west of Port Moresby.

(3) An area in which raised coral masses are a prominent feature. This includes portions of the eastern and south-eastern administrative divisions, that is, the district which has been called by Dr. Haddon the Massim district.

The Western Extremity of British New Guinea.

On the trip to the western end of the possession, and the partial ascent of the Bensbach river at the Anglo-Dutch boundary, we had the advantage of accompanying a Government party, to the members of which our thanks are due for much courtesy and consideration. Three whaleboats, one of which we occupied, were towed by the steam-launch *Ruby*.

West of Bugi the country is a vast flat swampy plain, presenting for the most part a uniform edge of mangrove swamp to the sea, broken only by the mouths of sluggish rivers and creeks whose banks are as a rule covered with mangrove in the lower reaches. Here and there, however, a sandy foreshore occurs; this is the case at Wallarter point, the eastern extremity of Jerai bay, where behind a sand-beach there rises to a height of about 4 feet a plain of loosely compacted sand and grit, from the edge of which we obtained recent semi-fossil shells of land and marine genera *Helix*, *Arca*, and *Cerithium*. Some 40 miles west of Wallarter point the mouth of the Bensbach river appeared as a break in the green-grey mangrove line, which hitherto had stretched as far as the eye could see, marking the junction of grey sea and greyer mud. For the first 9 miles the banks are fringed with mangrove, and present the appearance of a typical rhizophora swamp; above this Nipa palms become common, and the mangroves disappear. A little beyond this the banks are raised at intervals as much as 2 to 3 feet above the river, and bear a fairly open jungle containing many eucalypti, some of which resemble the larger Australian ti trees. On one such raised

area our first camp was made. Further up, lengths of this kind of jungle alternate with open grassy swamps, which, without any definite margin, seem to fuse with the reeds and sedges of the river-bed.

Above this a few coconuts appear at some distance from the river-bank, and soon native gardens, with a few patches of forest trees, occur on the higher banks. Throughout the distance ascended, the river, which presents a very winding course, varies considerably in width, some reaches being very noticeably broader than others they alternate with. About half a mile up-stream from its mouth, Lieut. Meyjes, of the Dutch navy, found that the river was 150 yards broad, and had narrowed to between 50 and 60 yards, where the mangrove belt began to give place to other vegetation. After the first day's travel there was enough drifting weed to obstruct the screw and necessitate frequent stoppages to free it.

We met natives belonging to the Toro tribe on the third day of our ascent of the river soon after scattered clumps of coconuts had become frequent on the higher ground at a little distance from the river. Our camp was pitched on the right bank of the river, on a small knoll on which grew an isolated clump of bamboo.

The natives were living at a place which appeared to be called Tivi, some 3 miles from our camp in a north-easterly direction, and thus on the opposite side of the river. This was stated to be a recent, perhaps temporary settlement, made among the marshes on account of the fear inspired by Tugere raiders from over the Dutch border. The track to the village passed through extremely rich taro gardens, the ground being drained by many cuttings about 1 foot deep and 18 inches to 2 feet across. Tivi itself seemed a poor village, with few things except the bare necessities of life. The houses stood upon the ground, and were not more than 5 feet high and 9 feet long. Their rounded roofs were made of ti tree bark. All the houses were open in front; many were also open at their opposite end, so that they were, in fact, mere roofed tunnels. In the better-built houses the bark roof was continued over what must be regarded as the back of the house, to within 1 foot or 18 inches of the ground. These houses were, in fact, similar in shape and general appearance, but smaller, than one figured in the Annual Report on British New Guinea (1900–1901), described as a house in the village of Gwaigar, on the Morehead river.

The Toro, for this appeared to be the tribal name for these Bensbach natives, are spare and moderately tall, with thin legs and often thin bony faces, projecting zygomata, and marked supraorbital ridges. Facially, they seem to vary more than other western tribes, some of them closely resembling examples of the less intelligent European types. The hair of all was frizzly, and the nostrils were generally bored, in some cases in two places. In many these holes had become very small, so that the plugs that some men wore were evidently not considered

important articles of toilette. Their noses are generally long and coarse, with moderately broad ridges, and often coarse fleshy tips which are never hooked. Generally speaking, the Toro appear long faced.* In some of the older men the front teeth had gone, in others the fangs were exposed by receding gums, but in every case their teeth were white, and no sign of betel-chewing was seen, nor were any lime-gourds noted. One of their favourite attitudes was to stand on one leg, with the sole of the other applied just above the knee of the leg which supports the weight of the body; in fact, they assumed the attitude figured by Grogan for the Dinkas of the Nile swamps.

With the exception of nose, hair, and arm ornaments, most of the men went naked. A few, however, wore a pubic shell. These were said not to have been traded, but to have been fetched by the Toro themselves from the coast between the Bensbach and Morehead rivers. As a rule, the shells were not ground, or in any way worked, though in one melo shell the curve had been so ground away as to expose the columella. Even this scant covering was as often as not worn at the side of the hip or behind as in front. Many of the men had tinea, and the only baby seen had yaws.

The women, of whom we saw very few, wear two kinds of covering—one that is practically a perinæal bandage, as on the Fly, the other a true petticoat.

Their weapons are bows, arrows, and clubs. The latter were few and extremely rough, and were certainly imported. Their bows are made of bamboo, and with these they make fairly good practice, as the following details show: A target about 3 feet long and 2 feet broad was put up at a convenient height, at a distance of about 40 yards. Sixteen men had each one shot at this, and, though no hits were recorded, many of the arrows went very near the target. It appeared that the time the arrow took to traverse the 40 paces was between 1 and $1\frac{1}{5}$ seconds. Each of four of the best shots then fired four arrows, with the result that but one of these hit the target once. The same men shooting at 80 yards scored no hits; but there was no general falling off in the shooting, their arrows being pretty thick all round the target. Their bows were strung with strips of rattan, and their release is that known as "secondary."

During our stay we saw a fair number of canoes. These consist of a hollowed tree-trunk, pointed at each end, and with no outrigger; they pole along with bamboos. As far as we could determine, paddles were unknown. We saw none, nor could we hear of any; but in spite of this a good pace was attained even in deep water, their

* Measurements bear out the impression of variability already referred to. The cephalic index of twenty-one men varied from 69 to 86, with an average of 74 and a maximum below 74.

unsplit bamboo poles being used as paddles by men standing in the bows and stern respectively.

At Tivi we saw a number of tobacco-pipes of the same type as those common throughout the Possession; in spite of this, tobacco did not prove good trade. Their own tobacco was light coloured, and seemed extremely mild.

The only musical instruments met with were the drum and whistle. The latter consisted of an excavated nut-like fruit, and a note was produced by directing the breath into a small opening in the way that

A MAN OF THE TORO TRIBE, BENSBACH RIVER.

a note may be produced with a key. The tympana of their drums consist of kangaroo skin, and the drums themselves were larger than those we had previously seen in this district. It should, however, be noted that far larger mammal-skin covered drums are said to be used some distance up the Bamu river.

The Toro are a totemistic folk, with descent of the totems in the male line. Perhaps the majority of the totems are birds. A number of palm-wood bullroarers were collected, but we could learn nothing about their use. Since, however, the Morehead river natives, whom the Toro closely resemble, use the bullroarer in their initiation ceremonies, it is probable that the Toro do the same.

The Valley of the St. Joseph River and its Neighbourhood.

The area constituting the plain and delta of the Angabanga is inhabited by a number of tribes which may be grouped into three main divisions, according to the language they speak. The first of these, the Roro-speaking group, stretches from Kivori near Cape Possession to Hisiu, to the east of Cape Suckling. Hisiu and the neighbouring village of Nabuapaka are, however, comparatively recent colonies from Waima; and Delena, which is in part composed of the descendants of a Roro-speaking stock, should probably be considered their old eastern limit. The native name for Yule island, which is inhabited by that one of the Roro-speaking tribes which gives the language its name, is also Roro, but in this paper the island will be called by its English name, Yule island, and the term Roro will be used only when speaking of the tribe in question.

Inland of the Roro-speaking tribes is a region which may conveniently be called Mekeo. This is inhabited in the main by two closely related tribes, the Biofa and Vee. The villages of these tribes, once the coastal Roro-speaking zone is left behind, stretch up the broad valley of the Angabanga till the foothills of the main range are reached. Mekeo seems originally to have been a Roro, or possibly Motu, term, and to have been applied in the sense just indicated; but the term should be extended to include a small and uncertain number of villages on the upper reaches of the Biaru river, possibly originally populated by Biofa-Vee folk, and with whom the present-day Biofa-Vee of the St. Joseph river valley intermarry. The whole of Mekeo lies east of long. 146° 40′, and, with the exception of the Vee village, Inawabui Kipo south of lat. 8° 40′.

The lower portion of the course of the St. Joseph river, *i.e.* about the first 20 miles from its mouth, flows through a flat and often swampy country, much of which is liable to inundation. Yule island at its mouth is, however, hilly, while a series of low hills stretch from Pokama to and beyond Epa. An isolated hill of bare basaltic breccia exists to the north of Eboa. Upon this hill, in shallow caves and under overhanging rocks, are exposed the Eboa dead. A few low ridges exist to the north-west of Obo, and there is at least one other outcrop of bare basaltic breccia. North-west of Bereina the country becomes hilly, the edge of the hills at first running more or less parallel with the coast, which it afterwards approaches, till at Cape Possession (Waimatuma) the foot of the hills is washed by the sea. These hills are covered with more or less rank grass and scanty eucalypts, and carry a good head of wallaby. Behind Waima the hills are about 400 feet high and about a mile from the sea. Here a considerable creek, called Uirkapa, in part fringed with mangroves, runs near their base and separates them from the villages of the Waima clans. These hills

consist, at any rate in part, of raised coral reef, since obvious corals were seen in the rocks skirted by the track from Waima to Bereina.

Along the coast of Yule island are a number of caves. One of the largest of these is called Paavi. Its walls consist partially of a coarse sandstone, becoming clayey in places; at the mouth of the cave the rock has weathered hard, and from it we obtained a number of recent fossils. Among these Mr. Woods identified an *Ostrea*, a *Lucina*, and *Pecten pallium*. At another point on the island *Spondylus spectrum* was obtained, as well as *Pecten pallium*. On the floor of the cave there is a rich black mould, which a few yards from the mouth gives place to a loose sandy soil. A fair amount of the cave floor was turned over, but no signs of occupation were found.

Along the shore between Pinupaka and Waima the beach consists of sand. Extending for some distance from Pinupaka there is a mangrove fringe, which is never far behind the beach, and in places approaches the edge of the surf, while here and there mangrove stumps can be seen below the present high-water mark. Besides these, and bordering the shore above high-water mark for a considerable distance, there stand the still erect dead bare trunks of large mangroves, not *Rhizophora*.

The meaning of these mangroves is ambiguous, but, with other facts adduced, would seem to point to recent elevation, the trees being killed by the increasing upward deposit of sand which now forms the beach.

Beyond Waima, between Cape Possession and Oiapu, is a free cliff edge of hard rock, which rises for the most part almost vertically from the sandy beach. In this are embedded many corals and marine shells. Among others, Mr. Woods has identified *Conus parius*, *Arca Deshayesii*, and species of *Loborium* (Triton), and *Balanus*.

Dr. Marr and Mr. Woods point out that the fossils obtained from Yule island and from the cliff between Cape Possession and Oiyapu leave no doubt but that the strata from which they were collected are post-Tertiary, and must be regarded as recent. This view conflicts with that set forth by Mr. Gibb Maitland, and represented in his geological map of New Guinea, published in the Reports.* In the paper alluded to, he describes Yule island and the strip of coast country between Bereina and Yokea, the latter west of Oiapu as the former is east of Waima, as consisting of Tertiary "Port Moresby beds." It must, however, be remembered that at the time Mr. Maitland's account was published the fossils he collected had not been critically examined.

Eastwards and southwards of the Roro-speaking tribes is Pokao, a district of low hills and rolling downs intersected by narrow belts of forest in its shallow valleys, but in the main constituting a country covered with long grass and sparse eucalypts. In many ways it

* 'Annual Report on British New Guinea, 1891-1892.'

resembles the country round Port Moresby, but is less arid, and carries an abundance of game. Its language does not resemble Roro, while its social system, as far as it is known, is also different. In spite of this, Pokao and Waima have long been closely associated, the Waima folk making comparatively prolonged stay in the Pokao villages on hunting expeditions. The return for this hospitality might be, and often was, a gift of coconuts; but the intimacy between the tribes went further than this. A generation ago one Poa Oa of Waima excelled in carving, and much of the best work on the older Waima marea was done by him or under his direction. He was asked to come to their village by the folk of Diumana of Pokao, and to carve the posts of their club house. This he did, and although the loe, as the Pokao club houses are called, for which he carved the posts has recently been burnt down, the majority of the posts carved by him or under his direction are still to be seen at a short distance from the present Diumana site.

The folk of Pokao, at any rate in certain villages, are conspicuous for their often wavy and even almost straight hair; indeed, as far as our present knowledge extends, there is here a larger percentage of individuals with hair which is curly or wavy than elsewhere in New Guinea.

Following the coast-line, immediately east of Pokao is a marsby area through which meander a number of streams. Of these the Aroa is the most eastward of any considerable size, while on the west the Veimauri river opens into the head of Galley reach. The district between these rivers known as Kapadi, or Kapatzi, we did not visit, but were able to ascertain that it was peopled by a folk who are the descendants of a faction which several generations ago split from the Mekeo village of Afai, and after many wanderings settled in Kabadi. This information, obtained at Mekeo, was interestingly confirmed at a big feast given by the administrator, Captain F. R. Barton, to which all the accessible tribes of the central district were invited. Here we saw the men of Kabadi wearing, as they danced, the feather clan badges proper to the Mekeo and Roro-speaking tribes, and in this case derived from and representing the kangakanga of the former.

The social system of the Mekeo-speaking tribes, though presenting features of great interest, will be but briefly alluded to here, and that only sufficiently to render the scant information gathered by the Rev. Father Egidi concerning the mountaineers behind Mekeo intelligible.

The Mekeo tribes consist of a number of clans, representatives of which are as a rule to be found in several villages. A number of clans claiming common descent form a ngopu group. For each clan there was a group called ufuapie, into which, it was stated, its clansmen should marry, and which took a prominent part in the death rites of its intermarrying clan. Every clan had an iauafangai, generally a

plant, which it did not avoid eating, and a kangakanga, an animal or plant which would not be eaten, though it might be killed, and its feathers, or if it were a plant its dried leaves, would be worn by the clansmen when dancing. Apparently all the clans belonging originally to a ngopu group had originally the same iauafangai, and the same name for their club house (ufu). Each local division of each clan would have at least two chiefs, called lopia fäa and io lopia. The latter was practically a war chief, and, except during actual warfare,

NARA WOMAN WITH WAVY HAIR.

his authority was greatly inferior to that of the lopia fäa. Both offices are hereditary, with the practical limitation that no one not a successful warrior could in the old fighting days have been an io lopia.

The Lapeka, living some 10 miles west of Oriopetana, are a folk akin to the Biofa and Vee, and some of the clans now living in the Vee villages appear to have originally come from Lapeka. A few Lapeka visitors seen at Ififu closely resembled the Mekeo folk proper.

Of the mountains inland of the Mekeo plain our knowledge is more limited, but that at least two groups of tribes, at present ill defined, but speaking different languages, inhabit these mountains is clear. These are the Kuni and the Kamaweka, the latter being the tribal name applied by Captain Barton to the hill folk living in the

neighbourhood of Inauvorene. Dialects which, as far as our present knowledge extends, show no obvious similarity are spoken by these two folk, that of the Kuni belonging to the group which includes Pokao and Motu. In spite of this linguistic difference, the two folk are alike in general appearance and dress, the women in both instances wearing a narrow perineal band instead of a petticoat. Neither group appears to be homogeneous, since the cephalic indices of the Kuni (15) vary from 75 to 82, with an average of 78, while the Kamaweka (11) vary from 73 to 81, also with an average of 78. Both folk are shorter and darker than the people inhabiting the Mekeo plain, and their hair is always frizzly.

On leaving the Mekeo plain and going north-eastwards from Inawabui Kipo towards the Kuni villages, two species of oak with oval entire leaves and broad squat acorns were met with. Tree-ferns, too, were seen, but were not abundant. The road, the merest jungle track, often overgrown, lay up and down a number of clay ridges, all densely covered with old jungle. At the bottom of each of these a stream runs, and it is on the crest of such a ridge, reached at the end of a long day's walk, that Foloa, the Kuni village nearest the Mekeo plain, is perched. It consists or consisted of four wretched houses, and a marea surrounded by a frail palisade. A day's walk beyond this lies Emene, a larger and more important settlement. The village occupies the whole plateau of trodden clay, measuring some 150 by 30 yards, which constitutes the top of the hill. The houses are placed round this area, from which run a couple of paths passing steeply down the hill to the gardens and creek. There is a marea (club-house) at each end of the village, said to belong respectively to the two chiefs Makua and Kapulau; these are similar in structure, and 18 to 20 feet long by some 10 to 12 feet broad. The roof was square behind—that is, at the back of the house, but rounded in front overhanging the verandah. The roof ends some 5 feet from the ground, being in this respect unlike the dwelling-houses, in which the roof comes down to within a few inches of the ground. The marea is two-storied; the first floor, level with the verandah, is made of split areca-like wood, and is about 3 feet from the ground; the second floor is 6½ feet above the first. Three main poles hold up the roof, which is about 18 feet above the ground. Along the middle of the floor of both stories, and interrupted only by the central main pole, is a fireplace about a yard broad, consisting of a thick layer of ashes between palm-trunks. A couple of tree-trunks are lashed along the sides of each house about 2 feet from the floor of the second story; these serve as shelves, and, in spite of the slope of the roof, were generally tenanted by sleeping boys. The houses of the village are small and miserably built; they tend to be circular, and, when seen on end, give the idea of being so. One which was measured was, however, 12 feet long by between 6 and 7 feet broad.

The door is but a hole in the thatch, which comes low down. There is invariably a gap in the side of the house left for pig, and there may or may not be a raised floor of planks, partial or complete. There were twenty houses in the village. Bows and shields did not appear to be used, the only weapons we saw or could hear of being spears and clubs.

Concerning the social organization and the customs of these mountaineers, the only information I possess is that derived from a letter from the Rev. Father Egidi, of the Sacred Heart Mission, who has recently been stationed at Dilava, which is, he states approximately, in lat. 8° 35′ 15″ S., and long. 146° 53′ 45″ E.* He

A KUNI VILLAGE.

(From a photograph by the Rev. Father A. M. Villodeau.)

points out that he could find no trace of intermarrying groups or groups of clans claiming common descent. The Dilava folk marry into all the surrounding villages, and when a death occurs it is the head of the family of the deceased who says when mourning shall cease. There appears to be no chiefship comparable with the system of hereditary war chiefs of Mekeo; any one who has killed his man and who has enough force of character may become a war chief, and this title implies no responsibility or specialization of function at feasts and ceremonies.

* I take this opportunity, on behalf of my colleagues as well as on my own, of thanking the Mission of the Sacred Heart for much help rendered and hospitality shown to us while working in the Roro and Mekeo districts. Among the staff of this mission, our thanks are more especially due to Mgr. de Boismenu and the Reverend Fathers Vitali, Egidi, Guibert, Cochard, Louis, and Pagest.

The ufu system seems less developed than in Mekeo. A peculiar ceremony is undertaken by the women and children of a dead man. These hold their face in the steam arising from a small pot in which is put a fragment of pork, while the rest of the village feast upon the pig from which the fragment is taken.

Of the Kamaweka of the Inauvorene district our knowledge is even scantier, and by the term Inauvorene district nothing more is meant than an ill-defined mountainous area north-east of Mekeo, some 20 miles from the Mekeo Government station, a portion at least of which is inhabited by the Kamaweka. It is reached by passing through Rarai and Ififu. Beyond the latter there is only a native bush track, at times difficult to follow. For the first six hours' walk this track passes through a swampy district, intersected by many creeks; over some of these the natives have constructed rude bridges by cutting down a tree standing in such a position that it could be made to fall across the creek it was desired to bridge. Towards the latter part of the first six hours' march the ground becomes covered with large water-worn stones, evidently brought down in the wet season from the hills. Near here the Biaru river is reached. When visited in 1904, the rainy season had scarcely finished, and the river was running swiftly with a depth of from 3 to 4 feet.

Near here the Ififu and Rarai people had built some ramshackle houses for their use when hunting and fishing. So far since leaving Rarai the track had lain through dense forest, which quite hid the surrounding country. A little distance beyond the native shelters a large branch of the Biaru is crossed, and the character of the scenery begins to change, and hilly country, with the Biaru flowing at the bottom of a gorge some 30 or 40 feet in depth, is soon reached.

The sides of this gorge are composed of rounded stones set in fine sand and gravel. It seems clear, before the Biaru had cut its present channel, it had flowed at a higher level, and had covered the country with washings from the hills. The path here keeps close to the river for some three hours' march, and then begins to steadily ascend, when the character of the ground soon changes. Instead of the ground being strewn with rounded pebbles, metamorphic rocks *in situ* are visible in the few places where the vegetation allows them to be seen. Some four hours beyond the native houses already alluded to is a sheer precipice some 30 feet high, which was descended by means of a bamboo ladder constructed on the spot. Probably this rock face was due to faulting. For a short time the path continues to descend, but it soon begins to rise again, and with few interruptions continues to rise, passing through dense forest almost until the top of a pass between the two Tulli peaks is reached. Beyond this lies a densely wooded valley with the Biaru flowing over its bottom. Beyond Tulli pass the road descends until almost the river-level is reached, after which it rises

steeply to the village of Inauvorene. This village is built on a ridge or grat, and, excepting on one side, is surrounded by precipices. A stockade surrounds it for the most part. The entrance to the village is on that side where there is no precipice, and here the second stockade has been built without the first. From Inauvorene several villages could be seen on the slopes of the opposite valley, at the bottom of which the Biaru river flows. By descending the slope of the Inauvorene ridge opposite to that previously ascended, and then travelling along the south-western slopes of the valley, the village of Ofafa was reached. The Kamaweka appear to be cannibals, and dispose of their dead by exposure on rough platforms in the forest.

WAGA AT TUBE TUBE: ENGINEER GROUP.

The Eastern and South-Eastern Districts.

At the south-eastern extremity of the possession our first prolonged stay was made at Tube Tube, in the Engineer group. This island, situated roughly halfway between the mainland and the Louisiades, supports one of the chief trading populations of the eastern archipelagos. The social system of these folk is substantially that which later we found to extend throughout a wide area in the eastern and south-eastern divisions of British New Guinea. Essentially this is a condition in which a community consists of a number of totemistic clans with descent of the totems in the female line. Each clan has at least three totems —a bird, a fish, a snake, and often a fourth, a plant. Each

clan in a given locality consists of a number of hamlets, each consisting of, say, from three to five houses, inhabited by a single family group. A number of such hamlets, scattered over a considerable area and inhabited by members of different clans, constitute a village.

One of the most interesting features of Tube Tube was a collection of waga, the large sea-going built-up outrigger canoes in which the men of Tube Tube made their voyages. The most careful inquiry failed to do more than elicit guesses as to the meaning of the carving with which the waga are ornamented. But since the Tube Tube folk knew that some at least of the waga were built on Murua, and since this was not far from the direction in which we must sail to reach the Trobriands, which Major Daniels had determined to visit, our journey from Tube Tube resolved itself into an island cruise in the track of the waga. And I may so far anticipate the order of our cruise as to say that waga are built not only at Murua, but also in the islands of the Marshall Bennet group, and probably, though to a less extent, at Misima, as they certainly are at Kiriwina.

Here, then, the waga are built and brought in one step or in a series of stages to Tube Tube, carrying with them almost always and wherever they go the original names given to them by their makers.* Without entering in detail into the technology of their building, it will be sufficient here to point out that these craft seem to represent the highest development of Papuan shipbuilding. Their length over all is often quite 50 feet, and their sides are built up with three or four broad hewn planks to a moulded depth of 4 or 5 feet, yet without a nail being used anywhere in their construction, and no wooden pegs are employed, except in connection with the outrigger. Nevertheless, the hull is strong enough to bear, not only the strains of heavy loads and high seas, but the even more trying stresses of continual beaching and launching. It is sufficiently rigid to hold the caulking in the seams, yet with a pliancy lent by its lashed fastenings which allow it to give when a rigid nailed fabric, unless enormously stout and heavy, would be very apt to tear itself apart and break up. The canvas of the waga consists of a single oval sail made of strips of pandanus leaf sewn together, while the ropes made, at any rate when repairs are necessary at Tube Tube, of hibiscus bast, form excellent stays and running rigging. Its size made the waga unhandy to paddle without a very large crew, or else at a very slow rate, and though a few paddles of the ordinary sort were carried, as well as the large one used for steering, they were seldom called into service, except in such an emergency as the wind failing and a current drifting the canoe into some position of danger. The craft was only intended to be used under canvas and for offshore work, or, as we should say, for deep-water

* The account of the waga here printed is condensed from Major Daniels' notes, as is that of Tokunu given on pages 240 and 241.

voyages. Tube Tube seamen aimed as far as possible to make a fair wind of it when they put out to sea, and the fortunate location of their island enabled them to go and come between many places during both seasons of the year, with at the worst a wind with which they could lay their course out and back. They could, however, work the waga to windward when their work lay that way, and although this was but slow travelling, their destination would be reached with speed enough to satisfy the easy-going natives.

The voyages of these folk are intensely interesting examples of primitive trading trips. Their crew always aimed to make a harbour every evening, and arranged their itinerary with this end in view, but they were not seriously disturbed if they had to spend a night at sea, either through failure of the wind, or when, as sometimes happened, they desired to reach a port more than a single day's sailing from the nearest starting-point. Without sufficient knowledge of the stars to sail by them at night, they could, in their island-strewn sea, if the weather were clear, generally see some land to guide them, and so kept on their way. If the night were thick, they lay to where darkness overtook them and waited for daylight. The storms of the north-west monsoon were probably the severest trial to their seamanship, for furious storms come up then almost without warning. These are, however, only of a few hours' duration, and when good management or good luck did not give them a haven somewhere under their lee, they downed sail, keeping the waga head to the sea, and rode it out as best they might. And what with good ships and good handling they must have had very few disasters, for we could not hear of a shipwreck within the memory of the oldest man on the island. Their trade route to Murua, where, it will be recollected, many of the waga were built, was, as they made it, about 120 to 135 miles. They would usually go during the monsoon and come back on the trade, as those winds served their itinerary best. Presuming that wind and weather served them throughout the passage, they slept the first night on an island called Ore, a couple of miles or so from Dawson island, the next night they made Panamoti, the third night they slept at Tokunu (the Alcesters), and by the fourth night they might reach Murua. As a matter of fact, this ideal passage was seldom or never made, and it was not at all unusual for canoes to be a month or more from Tube Tube to Murua, either because the wind and weather delayed them, or because the crew simply did not care to hurry themselves or found business to do *en route*.

Exports to Murua were varied, but included pots, and imports from there included stone implements and shell money (*sapisapi*). A considerable amount of food was brought to Tube Tube from Milne bay, a voyage which took two and a half to three days. They also made frequent voyages to East cape, South cape, and to Dobu, the latter being the island from which the Tube Tube people originally came.

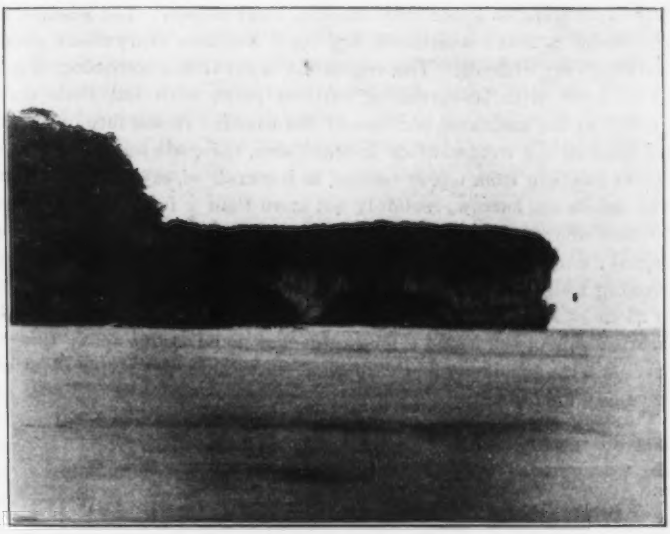
The details just given, taken from Major Daniels' manuscript, embody information furnished by men who evidently had actual voyages in mind when they spoke. The time occupied for any journey but the very shortest was, however, different each time the voyages were made, and it is certain that the routes were often varied to suit some special commercial object. The specimen of the voyages given will serve to convey an idea of the nature and extent of this people's wanderings in pursuit of trade, and the number of places along their route with which they were at one time or another at war throws a lurid light on the courage and diplomatic skill without which they could never have gone so far or accomplished so much. We did not visit Wari (Teste island), but it did not seem to us that any other south-eastern natives we met had just the qualities of the Tube Tube folk, who sailed the troubled commercial waters and rough seas with something of the insouciance of the English merchant venturer of Elizabeth's days; laden for trade, but armed for combat, their spears were quite as sharp as their wit, and they themselves equally ready to use either as circumstances might require.

On leaving Tube Tube, we sailed for an island called Ore, whither the folk of Panamoti, who at times were said to act as the middle men in the matter of procuring waga for Tube Tube, had recently moved. As a matter of fact, we made Gabuyene, about 2 miles from Ore, where there are two small villages of Panamoti folk. Both Ore and Gabuyene belong to the Laseinie group. From Gabuyene we sailed north-eastward in the direction of Murua, anchoring on the first night after leaving Gabuyene off the Bonvouloir reefs. These are not as figured on the chart. A portion of the system, perhaps that alluded to in 'Sailing Directions,' consists of an oval atoll, which appears to be about a mile and a half long by three-quarters of a mile broad. On the windward side of the atoll are three low densely wooded islands, oblong in shape, one of which is Panamoti. There are a few small masses of reef and detached coral rocks to the east of the most easterly of these. On the lee side, near which we anchored, the reef is 2 to 4 feet deep at high water, and consists of land studded with rounded isolated masses of coral. The lagoon appeared to be from 4 to 6 fathoms deep.

From the Bonvouloir reefs we made Sharp island *en route* to Murua, but, the weather proving thick, we put back to the Alcester islands. These, marked "position and extent uncertain" upon the charts, consist of two elongated flat-topped islands, which are densely vegetated. They rise at their highest point, at the eastern end of the larger island, to a height of some 180 feet above the water. The bigger island, called Tokunu, presents one small cove, in which nestles a village—that is to say, seven houses divided into four groups, each group belonging to and inhabited by men of one totem. In the 'Sailing Directory of the Pacific' it is stated that Tokunu "is inhabited by a roving tribe of

natives, who are reputed to be the most skilful canoe-builders in this part of the Pacific."

This information appears to have been gathered from the Report for British New Guinea for 1888, which contains a statement furnished to the Special Commissioner by Mr. W. Whitton. In this it is stated that many large canoes [waga] are built at Tokunu, and that there are no gardens on the island. The latter statement is certainly incorrect, and we have no reason to believe that waga are or were built at Tokunu. In fact, all the evidence points the other way. The present small population of Tokunu has been alluded to, while there is but scanty space on the strip of beach which constitutes the landing-place for the



TOKUNU. WAVE-CUT NOTCH IN CLIFF ABOVE PRESENT SEA-LEVEL.

building of any large canoe, and were there space it would be difficult to understand how the timber could be got into position, since the raised coral cliffs of which the island consists are elsewhere practically sheer. At the cove the cliff is roughly 100 yards from the sea, the intervening space being a sharp slope of broken, highly crystalline coral rock, filled in with black mould, and thickly forested. There is no appearance of stratification in any part of the cliffs of the island. At sea-level the cliff is slightly undercut, while there is similar evidence of wave-action in many places many feet above the present sea-level. A profile view of what was apparently a wave-cut notch many feet above present sea-level is shown above. On both the windward and

leeward sides of both islands there is no fringing reef proper, and the islands are very steep too; but in certain places, sometimes off points, sometimes in bays, the water for 50 to 300 yards from the shore sloped gradually to 12 fathoms, with a bottom of coral sand and mushroom-shaped coral patches.

From a distance the island appears flat topped, and the cultivation ground in the centre of the western part, where the forest has been cleared from at least 300 acres, is remarkably level. The same conditions prevail in the forested parts, except that there is a slight rolling uplift along the leeward side, probably not over 4 to 5 feet high and 100 yards wide. On the windward side, very near the cliff-edge, and roughly following its present contour, is a ridge 8 to 15 feet high and 200 yards wide, of apparently tumbled coral masses. The whole top of the island is much weathered, low coral boulders everywhere making walking very difficult. The vegetation is luxuriant, consisting of great forest trees with far-spreading buttress roots, with but little undergrowth in the uncleared portions of the island. In the face of the cliff, whether on the windward or leeward side, there are numerous vertical cracks running from top to bottom, at intervals of, say, 30 to 200 yards. The cracks are narrow, certainly not more than 2 feet wide until 10 to 20 feet above water-level, where the undercutting action of the sea begins; here they widen out into caves from 3 to 10 feet wide, evidently running many feet back. The only path to the top of the island ends in 25 to 50 feet of what is practically an easy chimney climb. On the weather side of the island a long talus was noted at one spot; this was covered with pandanus and casuarina—elsewhere the latter plant was decidedly uncommon.

(To be continued.)

BRITISH EAST AFRICAN PLATEAU LAND AND ITS ECONOMIC CONDITIONS.*

By Major A. ST. HILL GIBBONS.

It will be remembered that some two years ago an offer of a considerable tract of territory was made by His Majesty's Government to the controllers of the Zionist movement. The principle involved in this offer is quite exceptional, whether viewed from an economic or an administrative standpoint. An autonomous province under a Jewish administration—but subject in certain respects to the control of the Administrator of British East Africa and the Home Government—was to be created within our East African empire. With the political aspect of the offer I have not—nor had I at any time—anything whatever to do, but all must agree that in this respect His Majesty's Government

* Read at the Royal Geographical Society, January 15, 1906. Map, p. 324.

could have been actuated by none but the highest philanthropic motives. Economically speaking, my view is that a most interesting colonizing problem was involved, for had the scheme been carried through in the spirit in which the offer was made, scientific experiment combined with methodical industrial development should have provided useful object-lessons both to those who settle on the land, and those who control the destinies of our infant colonies.

One of the first conditions imposed in connection with this offer of territory was that a commission approved by His Majesty's Government should proceed to East Africa with instructions to examine the Guas Ngishu plateau—the special territory offered—with a view to reporting on its adaptability to purposes of European agricultural settlement. It was as chief of this commission that I was able to collect the subject matter of this paper. One of my colleagues—Herr Kaiser—was a gentleman of considerable scientific knowledge. As botanist and geologist, he had previously visited Northern and Eastern Africa with the German explorers Schweinfurth and Schoeller. While serving with the latter expedition he had traversed the southern part of this same Guas Ngishu plateau. My second colleague was a gentleman who had never before travelled in Africa.

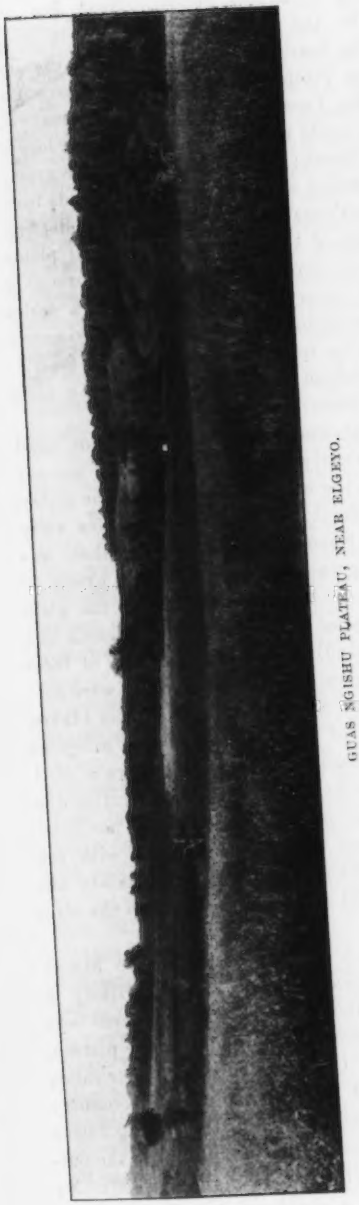
We landed at Mombasa on January 13, and the following afternoon entrained for Nairobi, having with us the whole of the expeditionary equipment, personal servants, a headman, and a nucleus of ten porters. Feraji, the headman, had crossed Africa with Stanley, and since then had been largely employed on "safari" in East Africa. A single day at Nairobi gave time to arrange matters with the commissioner, the late Sir Donald Stewart, and to augment the caravan to about sixty—the minimum strength I considered adequate for purposes of transport and private service. We reached Nakuro late on the 17th, and on the following day—the fifth since landing at Mombasa—the entire caravan started with loads for the Eldama ravine.

The first day's journey from Nakuro along the Great Rift-valley is dry and shadeless, there being no water until the little Rongai river—19 miles away—is reached. This does not flow into the Molo, as shown in the existing maps, but about 6½ miles north-east of the crossing of the caravan-route all trace of a bed ceases, and the river itself disappears below ground. The water of the Rongai is good, and even at the end of the dry season has a strong flow. An ascent of 1500 feet during a march of 20 miles brought us on the second day to Eldama ravine. The Government station stands in an ideal position on the summit of a steep ascent of some 200 feet, and is all but 7000 feet above sea-level. Though it stands only 3′ 25″ north of the equator, the Ravine has the reputation of being the most temperate—not to say the coldest—station in the protectorate. There are few healthier spots in Africa or elsewhere. The view is superb. Mount Eldalat, the Mau, the Kamasia

mountains, and the great rolling forest-clad hills which at 8000 feet form the escarpment of the Guas Ngishu plateau, supply on all sides the background to a heavily wooded undulating country, occasionally relieved by open patches of good natural pasture and the rich red face of the ravine from which the station takes its name. From the Ravine to the south-eastern extremity of the plateau a track through the dense virgin forest—available for foot-passengers only—has been cleared of undergrowth. This leads over steep undulations, each as a rule attaining a higher altitude than the one previously traversed, until finally, after a fair day's march, the forest gives place to a magnificent country of open rolling downs, capable of becoming a great cattle district. Thus on quitting the valley immediately to the west of the Ravine station, the altitude of which is about 6500 feet, the traveller finds himself, in about half an hour, in the Langas valley, at 7410 feet above sea-level; he follows this stream for over a mile, and then commences a rapid ascent of 750 feet; next he drops 450, then up and down and up and down, until he stands, at a height of 8650 feet above sea-level, on what is apparently the highest undulation within a comprehensive view. One or two hills at the southern extremity of the Elgeyo escarpment rise a few hundred feet above this, but, excepting Elgon with its 14,200 feet of altitude, and some of the higher peaks of the Chibcharagnani or Chipchangwane mountains—seven good days' march to the north—these south-eastern undulations eclipse in altitude the many considerable hills which, later on in our journey, supplied such excellent landmarks and useful points of observation.

During the first day's journey over these invigorating highlands we crossed the path by which Major (now Sir Ronald) Macdonald traversed the plateau. His name and those of Schoeller, Pringle, and Austin represent the only expeditions which had hitherto visited Guas Ngishu for purposes of geographical research, and their combined work was restricted to a triangle in the southern section of the plateau. Major Austin also passed along the eastern base of Mount Elgon, and the mountain itself, whose towering mass may be seen on a clear day from any part of the plateau from where it is not obscured by intervening obstacles, has been visited at one time or another by protectorate officials and others, notably by Sir Harry Johnston, whose interesting account of his experience created in me a wish that Elgon had been within the scope of our inquiry, or that the time at our disposal had not been so limited as to preclude the possibility of my climbing to the crater.

The first camp on the plateau—8500 feet—was on the fringe of a wide alluvial valley, which will doubtless be ultimately turned to useful agricultural account. Down the centre of it flows the little Kinuyno river, and this, a few miles further, joins the Nesoi—a stronger stream, which a mile beyond the confluence plunges over the Elgeyo



GUAS NGISHU PLATEAU, NEAR ELGEYO.

GUAS NGISHU PLATEAU, LOOKING EAST.

escarpment into the Kerio valley 3000 feet below. Next day we reached what seemed to me to be the ideal spot at which to camp for a few days, while Feraji, the headman, returned to the Ravine for further supplies. Camp was pitched about 30 feet above the springs of a small affluent of the Leosos, known as the Samabula. Beyond the stream, and about 100 yards to the east, were the borders of a considerable patch of primeval forest; to the west alternative grassy undulations and narrow valleys marked a falling away in altitude from 8000 to 7000 feet within half an hour's march. Obviously, the collecting of grasses and a careful examination of the various timbers and plants in the forest would suffice to keep our botanist, Herr Kaiser, thoroughly occupied. For myself, I saw an opportunity, by means of a series of short excursions, not only of studying the material and economic prospects of the district for some miles round, but of laying the foundation of a reliable survey of the plateau on as comprehensive a scale as the few weeks allowed us would permit.

Some 70 miles to the north-north-west a good view of Elgon could almost invariably be obtained in the early morning, and on the summit is a definite point which I take to be the north-eastern face of the crater. Slightly to the west and east of north, and 25 and 30 miles away respectively, were Mount Sirgoi and Karuna hill, and beyond these was a prominent peak of the Chipchangwane range, while the group of hills of which Mount Ildalat is the most noticeable breaks the plain 25 miles to the north-west. By a series of observations on north and south stars, I hoped to find the latitudinal positions of each of these points, and also, so far as those lying on my northerly route were concerned, to determine the exact relative distance of each to the others. With this line of bases for purposes of triangulation, I was sanguine that numerous and carefully read compass bearings must give a good result, and, as a commencement, I devoted much of my time during the next few days to taking bearings on my points from different positions, in order to assure myself that no local variation interfered with the accuracy of the result. The one condition which gave me anxiety was the state of the heavens, for every night since leaving Nakuro the stars had been obscured by clouds.

On one occasion I decided to make a day's excursion to the Elgeyo escarpment, which, as forming the eastern boundary of the territory in question, was a feature of some importance. I took with me three boys and a Masai, who, as one of three professing a knowledge of the plateau, was engaged at the Ravine as a guide. Crossing the stream near camp, we passed through the adjoining belt of forest to the park-like country beyond, where small patches of forest gave relief to the rolling downs characteristic of the country. Two miles of this brought us to the outskirts of a forest which seemed to stretch far to right and left. My Masai guide had [his] work cut out for a couple of hours or more, as,

with the exception of a half-mile opening along the borders of a marshy stream, every step of the way was contested by an entangled and at times prickly undergrowth. I found ample compensation in the view suddenly encountered on emerging from the forest. So dense are these East African forests up to their very borders, that one frequently does not realize the existence of open country until within half a dozen paces of stepping into it. Such was the case in this instance, and no doubt the sudden contrast in light to some extent enhanced the beauty of the picture in front of me. To the left and left front was apparently illimitable forest; immediately before me a grass bank sloped down to a strong stream, which proved to be the Nesoi; beyond was the face of a second steep undulation, open for the most part, but dotted here and there with small groups of great trees wrapped in vines and under-scrub; while flowing directly towards us from the east was the little Kinuyno, speeding its course in a series of glistening cascades to join the Nesoi on its journey into the great valley beyond the escarpment.

Crossing the Nesoi, I took lunch in a shady spot above a small waterfall, and then proceeded to skirt the forest in an easterly direction until we struck a well-defined native path at the base of a hill whose slopes were covered with forest, but whose summit was clear. This we climbed for some 2000 feet, passing, when near the summit, through thick bamboo forest. From the crest of the hill I could not see as much as I had hoped for, as all distant points to the north-west were obscured by intervening hills. However, I obtained a good view of the south-eastern line of the escarpment, as well as of two important points to the south-west. While descending the hill we encountered two natives, who informed us that they lived in the Kerio valley. Lithe, active-looking fellows of medium height, these people are somewhat extravagantly decorated with beads, wire, and charms. They drape their shoulders with skins, but ignore clothing elsewhere. Their hair is well greased into ringlets with a preparation of fat and red earth, and they carry spear, bow, and arrow. Occasionally during my subsequent journey I met with small hunting parties of these tribesmen, but with the exception of the remote fastnesses of Elgon and the Chipchangwane mountains in the north, I doubt whether a human habitation exists on the plateau at the present time. Occasionally the ruins of unmortared stone walls remind one of the previous existence of a population. That a branch of the Masai race at one time occupied Guas Ngishu is accepted as beyond doubt, and it is also an established fact that their brethren of Naivasha cleared the plateau of settled inhabitants, but so varied are the accounts of this depopulation, both as to time and detail, that the story of the tragedy is largely conjectural. It is, I think, probable that thirty to forty years have elapsed since the plateau became the grand wilderness it is to-day. The people who

occasionally roam over it for purposes of hunting or depredation are in no way akin to the Masai. Those already described hunt game in the neighbourhood of the Elgeyo escarpment in small parties of six to a dozen. They are harmless, timid, and well disposed. The Nandi and their kindred the Kamasia are more predatory in their habits, and are not above acts of robbery when they see their way to perpetrating them with impunity, and, as can be imagined, the dense forests offer exceptionally good cover to those who desire concealment. On the return journey I avoided the forest by making a southerly *détour*.

Cloudy nights continued until the second night before striking the Samabula camp, but from that time onwards until our return to Nakuro the heavens smiled upon us, for I seldom missed a night without taking at least three observations for latitude.

I now decided to put into practice the system on which I have always worked in Africa, *i.e.* allot to each his sphere of action, and leave it to him, untrammelled by others, to carry out his own work in his own way and to his own credit. While I travelled as far north as practicable, and then, gradually trending to the left, described a large circle, my general instructions to Herr Kaiser were, first, to form a base camp as near as water would allow to Mount Sirgoi, a landmark unmistakable from any position in the centre of the plateau; and, second, to visit the lower slopes of Mount Elgon, where interesting botanical and geological results might be expected. Although not possessed of any other surveying instrument than a compass, I trusted that on this plan, since his path would of necessity cross my route twice, his journey would supply a useful addition to the map. Unfortunately, this second condition was not realized, and for this reason I am compelled to accept sole responsibility for the map I place at the disposal of the Society. To my second colleague I gave a free hand.

My instructions to my Masai guide on recommencing the journey were that we would bear north-north-east until we struck the Elgeyo escarpment, which I was anxious to visit. I should state that from the southern point of the escarpment to as far north as the eye could reach from points of vantage near my northernmost camp, there extends a belt of primeval forest varying in width up to 8 or 9 miles, and probably wider in the extreme north. Through this a few hunters' paths lead from the plateau to the valley below.

On this occasion my guide started off in the right direction, but later I noticed a distinct tendency to bear westwards. More than once, when paths branched to right and left, and he chose the latter, I protested that it was to Elgeyo, and not to Sirgoi, that we would go, and each time I received a plausible explanation. When towards evening we collided with Herr Kaiser's caravan, and I discovered that we had been led by a circuitous route to the direct road to Sirgoi, things came to a crisis, and the delinquent walked into the forest and

sulked. I once more bade adieu to my colleague early next day. This time I took the lead, and the guide followed. Half an hour brought us to the edge of the forest, giving a direction slightly north of east. On the average we made progress at the rate of about a mile an hour, being occasionally helped during the afternoon by a network of elephant tracks, most of which were useless to us, as they led to the north and north-west, though a few ran north-east for short distances, and of these we took full advantage. The sun had been down ten minutes when we stepped into the open from a patch of bamboo forest. The aneroid indicated 8600 feet above sea-level. Before us, and apparently covering an area of about 1000 acres, was undulating grassland, occasionally relieved by small clumps or strips of forest trees. A steep slope led to a strong mountain stream of clear cool water flowing westwards. This was apparently the Algarenye, a southern tributary of the Nzoia system. Next morning, on approaching my washing-basin, which always stood outside the tent, filled overnight ready for my morning ablutions, I found the surface to be a sheet of ice about a quarter of an inch thick. The sun had already been up over half an hour when I examined the minimum thermometer. Unfortunately, the spirit had separated, and no indication was left of the minimum night temperature. Two other thermometers at the time showed that there were still two degrees of frost, so that probably six or seven degrees could have been registered in the small hours of the morning.

That day I went in search of the escarpment, and in an hour and a half reached it at a spot where the overhanging trees obscured everything but the fact that an almost abrupt precipice lay at my feet. After travelling north-north-west for a further 2 miles, we struck a native path, which led to an open space. When 200 or 300 yards from the escarpment this second time, a great murmuring noise was to be heard ahead. It increased proportionately with our advance, and in a few minutes I fully expected to gaze on a great waterfall plunging over the brink of the escarpment. In a few moments I stood in a position which could not fail to impress the most apathetic temperament with a sense of Nature's grandeur. It is true my waterfall, which would have added lustre to the scene, had proved a myth. I had merely heard a heavy wind striking the face of the precipice below me, and, thus turned upwards, disappearing into space without so much as disturbing a leaf a few paces from where it dashed impotently against the red-faced cliffs. To the left, a slight curve in the alignment of the escarpment gave the opportunity I looked for to determine for some miles northwards the eastern limit of the territory I had come to examine. In front, I looked straight down without a break into the Kerio valley 3000 feet below me. The scene had the appearance of a great map in relief, with its hills and valleys, its main river-bed and subsidiary watercourses. The Kamasia mountains, which from the

Rift-valley beyond rank as a considerable mountain range, were dwarfed by the height, from which they were seen 20 miles away. Another 40 miles beyond, the dim blue outline of Laikipia was clearly visible. Next night was spent in the open not far from the previous camp, where clouds had obscured the stars just as I was preparing for a series of observations. On this second night, however, fortune smiled on me, and I was able to fix my position. In this neighbourhood the turf was in places intermingled with clover, and a tasteless raspberry also grows. Perhaps the most striking feature is the beds of white everlasting flowers through which a path had occasionally to be cut. It took a day and a half travelling in a westerly direction to clear the forest on the return journey, though fortunately a small open space—the only one encountered—supplied a convenient camping-ground, from which I was again able to determine my latitude.

On reaching the open, direction was changed to the north, and for a day and a half we passed over downs similar to those already described. Starting at about 8000 feet, with the forest belt on the right and the ground falling away to a vast plain on the left, we gradually dropped to 7400 feet, and camped near Karuna hill, on the edge of the plain itself. Here the ground was dry and the vegetation parched, and it was found necessary to send 2 miles for water. A porous lava was visible in many places, and at best but a thin layer of surface soil covered the rocks.

Four miles north of Karuna we had ascended over downs to an altitude of 7750 feet, and then, in something less than a mile, had dropped nearly 300 feet, and were following the base of a ravine, bounded on the east by a steep heavily wooded slope leading to a continuation of the high ground left behind, and to the west a long hill culminating in five rocky summits, and in reality a spur of the Chipchangwane mountains. Our descent to the lower level had brought us into a broken, hilly district, the existence of which had not been suspected a quarter of an hour earlier. A river, which without doubt is the parent stream of the Nzoia system, skirts the eastern base of this hill, and, rounding the southern extremity, takes a westerly in place of its hitherto southerly course. The next few days disclosed the fact that the depression we had entered extends to the western side of the plateau, where it is lost in the gradual decline to its level of the southern plain. It is triangular in shape, and is much broken by stony kopjes and steep hills. A fault running east and west separates it from the plain; the Chipchangwane mountains bound it on the north-east. Following the Nzoia for a few miles, during which progress was very difficult owing to the entanglement of forest undergrowth enshrining every small tributary to be crossed, the absence of native or even game tracks, and the long coarse growth of grass, much of which attained a height of 6 or 7 feet, we finally crossed to the right bank of the

river (which was about 15 feet wide by 2 feet deep), and pitched camp near the northern end of the hill previously described. Next morning I climbed this hill, while the caravan worked its way round the northern base. The summit commanded an extensive view of the country around. To the north a bold rough country presented itself to my view, where a great group of mountains lay back for many miles, some apparently attaining an altitude of 10,000 to 12,000 feet. One was abrupt and rugged, another of a gentler gradient, a third faced by a great red precipice, and so forth. The general character of the vegetation was grass and scrub, but here and there a hill is covered, or partially covered, with dense virgin forest. It is grand but inhospitable, and probably will remain so long after the neighbouring plains are dotted with homesteads and covered with cattle. To the north-east and east there appeared to be interminable forest, interspersed at rare intervals with small patches of grassland. To pass through this and round the northern base of the mountains as I had hoped to do would require much more time than was allowed me, so I decided to travel along the fringe of the Chipchangwane range in a north-westerly direction. For two days we passed through a mountain valley entirely given over to the beasts of the field. Game was plentiful, and I have never heard so many lions at any one place as I did round my second camp in that valley. The four succeeding days we travelled along high pathless mountainous ground until within 10 miles of the eastern base of Elgon. The satisfactory feature of this part of the journey was that, not only did it take us across the upper waters of the whole of that section of the Nzoia system emerging from the Chipchangwane range, but from the many hills passed over I was able to get a fairly accurate idea of the general flow of the system. I was particularly surprised to find so much water flowing at the very end of the dry season; many streams within quite a short distance of their sources were from 15 to 25 feet wide and 1 to 3 feet deep. Before turning southwards I climbed a hill which commanded a good view of the country as far as Mount Kisimachanga—a north-eastern spur of Elgon connecting that mountain with the Chipchangwane group—as well as of the whole valley to the west and south-west. Immediately between Elgon and where I stood was a belt of undulating grassland some 10 miles in width; to north and south of this a scant acacia savannah extended as far as the eye could reach. On the slopes of Elgon there appeared to be samples of everything already described as existing on the plateau—first savannah, then alternate grass and virgin forest, and above that the rugged boldness characteristic of great mountains. One thing was very noticeable, viz. that the area of plateau-land between the bases Elgon and the Chipchangwane range is only about one-half of that shown in the official map of the district. We now followed a direction slightly west of south, until on the third

day camp was pitched on the Nzoia river, near a series of rapids about 20 miles from where the river enters the Kavirondo country. The Nzoia was forded at a small rapid where the water was knee-deep, and in places so fast-flowing as to make foothold difficult. The bed of the stream here was 60 feet wide, though in more normal places, where the water is considerably deeper, its average width is little more than half this. We had now sunk to a level of 5650 feet—the lowest altitude we touched on the plateau, though a few miles to both north and south the ground rapidly rises to 6000 feet and over.

The following day we crossed the Kubkong, and camped at the base of a group of granite kopjes, of which Ildalat and Kekupe are the most prominent. The Kubkong is the most important of the Nzoia affluents within the confines of the Guas Ngishu, and drains an area about equal to that section of the Nzoia basin lying above my crossing of the previous day. Yet at the respective crossings the volume of water in the Kubkong was approximately only one-quarter that of the Nzoia; in fact, there appeared to be almost as much water in some of the head-streams of the former river quite close to the Elgeyo escarpment as at this point. The porous nature of the volcanic rock formation, which in the intervening plain lies close to the surface, must account for this depreciation in water-power, for the influence of evaporation in so short a distance with a mean fall of 43 feet in the mile would be inappreciable.

A single day, of which some hours were spent making notes of the surrounding country from the summit of Mount Kekupe, was spent at this camp, and the next evening we camped near Sirgoi. It took two days to discover my colleagues, who were enjoying repose in a hollow 5 miles to the north of Mount Sergoi, and then the return journey commenced.

The game on Guas Ngishu is very plentiful. Hartebeest, topi, zebra, ostrich, water-buck, reedbuck, kob, bushbuck, eland, giraffe, and rhinoceros in the lower country, while numerous elephants and an occasional buffalo confine themselves mainly to the fastnesses of the forest.

In point of altitude, though a very small proportion of Guas Ngishu is under 6000 feet, the basin of the Nzoia where the river quits the territory is about 400 feet below that standard. Extending thence along the eastern base of Elgon northwards there is but an insignificant rise. Passing eastwards from this line, and limited in the north by the Chipchangwane mountains, there is a general rise of 40 feet in the mile until within 15 miles of the Elgeyo escarpment, where the proportionate rise increases to from 100 feet in the south to 70 in the north, culminating in an altitude of about 8500 and 7500 feet respectively. Due east we find the Laikipia plateau falling away in an opposite direction from an altitude at the escarpment of about 7500 feet in the south and 6500 in the north, or about 1000 feet lower than Elgeyo all along the line. It would almost appear, therefore, that the great upheaval

which created the original plateau centuries before the subsidence of the intervening 50 miles, now occupied by the great Rift-valley, divided it, had its principal point of energy a few miles to the east of the south-eastern extremity of Guas Ngishu—probably where the Kamasia mountains now stand.

A plateau so high above the sea-level, where water flows so rapidly as to deprive the mosquito of his natural breeding conditions, and where there appears to be an almost total absence of that rank river-vegetation he loves so well, should be more than ordinarily healthy. It is true our visit was limited to a few weeks at the end of the dry season, but there is high ground in Africa where the mosquito is not to be found either in the dry or wet season. So too with fly-life generally, although the common fly was troublesome in parts of the Rift-valley, I saw none on the plateau.

Though many readings were taken for maximum and minimum and other temperatures, a single six weeks, commencing towards the end of January, can have but a comparative value. Until within a week of the first shower of the rainy season, when a considerable rise in temperature is to be expected, the maximum was extremely stable, varying only from 71° to 74° Fahr., while the mean minimum stood at 40°, though here the range was wider—37°·5 to 47°—and on one occasion, already alluded to, sinking to 5° or 6° below freezing-point. Here, however, the local conditions were to some extent exceptional, as is shown by the fact that, although Herr Kaiser, who was 9 miles to the south-west, and at an altitude only 500 feet lower, did not read for minimum that night, he registered 3° Centigrade = 37°·4 Fahr. at 7 a.m., whereas at the same time my thermometer stood at 30° Fahr. Comparing these results with monthly averages taken throughout the year on other high ground near the equator, where the monthly variation is not so extreme as in the more northern and southern tropics, we would expect the mean-maximum to vary from 68° or 70° in the colder months to approximately 75° in the hottest month, and the minimum from 37° to 45° respectively, with occasional extremes to 100° and some half-dozen degrees below freezing-point. Thus there is nothing in the temperature of Guas Ngishu to prejudice its colonization prospects.

Turning to the ultimate material prospects of this district, and, in fact, of East Africa and Uganda as a whole, I admit that it is my firm belief that these protectorates are destined to hold a high position among the future states of our African empire. Not only do I hold them to be "white man's countries," but I believe the higher altitudes will earn a great reputation among the admittedly healthy countries of the world, and that they have a considerable agricultural and pastoral future. I may be too sanguine, but I do not think so. At least, I console myself with the reflection that very little good was ever done in this world without the stimulus of optimism—not to say idealism

In the interests of all our young African colonies, may we venture to hope that their administration will be carried on in a spirit of optimism. Pessimism and *laissez faire* spell stagnation; though optimism may not attain its ideal, it will at least leave no stones unturned. The history of the empire is replete with instances in support of this contention, and in Egypt and Rhodesia, Africa itself has within the last fifteen years supplied two remarkable instances of what can be achieved by administrators who take the most liberal view of possibilities. To consider what these countries have been, what they are to-day, and what, in the ordinary sequence of events, they promise to be to-morrow, is but to realize in its full import the distinction between the productive capacity and the economic prospects of a country. The one reminds us of nature pure and simple, the other of nature tempered with industrial and administrative effort.

The territory under discussion comprises some 6000 miles, of which about 400 are covered with a great entangled forest largely composed of podocarpus and juniper. Experts have examined similar forest land lying to the south of the plateau, and have pronounced favourably on a fair proportion of the wood obtainable. Perhaps the tree which most attracts the passing traveller is a giant cedar, which in a long straight trunk towers to a height of about 100 feet. For a rapidly growing local market these forests should afford scope to private enterprise, and at a future period they will, no doubt, supply a profitable export trade, if not to Europe, at least to South Africa, which is extraordinarily deficient in useful timbers. Obviously before this great asset can be exploited on a large scale, not only must branch lines be laid to the bases of operation, but arrangements for very special rates of transit must be made with the controllers of the Uganda railway. Sea-freights, though higher in the East Coast trade than the interests of such an industry would demand, will come down automatically as the volume of trade in general increases, for at sea there is existing competition, which already shows sign of further development as a result of a growing impression that East Africa has a useful future.

Of the rest of the plateau, about one-third is mountainous, and the remainder composed of downs open and undulating or covered with savannah, principally acacia. The soil is chiefly of that red ferruginous clay common to many parts of British East Africa, Uganda, and Central Africa, from the Congo-Zambezi watershed northwards. In the higher altitudes this soil attains a great depth, as may be seen where watercourses have cut a deep bed for themselves. On the whole it grows a good pasture, which ultimately would materially improve with the introduction of cattle to graze it down. For agricultural purposes, this soil is excellent in lowlying land or valleys where it has a chance of absorbing moisture; but, generally speaking, where

this red laterite occurs on Guas Ngishu, the undulations are so steep as to drain rain-water too rapidly over the surface to allow of much penetration. In places where the country is flatter, a yellowish clay is found. This is not so good for agricultural purposes, but grows a fair pasture, though, as a rule, where it occurs the porous lava-bed is so near the surface that towards the close of the dry season the veldt presents a very parched appearance. On the whole, I should say the plateau is unquestionably capable of carrying as much cattle as any other like area in Africa. That grazing stock will thrive, I considered to a great extent proved by the very prime condition of cattle and donkeys at the end of the dry season on a farm provisionally occupied by the three Africander farmers previously mentioned. I was just in time to see these beasts, which were shortly afterwards stolen and driven into the neighbouring forest by a gang of Nandi thieves. Generally speaking, sheep and goats would not do well here, though there are a few districts, principally in the west and north, where they should thrive. Wild ostriches are found on the Sirgoi flats, so presumably the domestic bird might be kept with advantage. Agriculture, except in small selected districts, is not likely to play more than a very subsidiary part in the future development of Guas Ngishu. Farmers will, no doubt, supply their own needs in cereals and vegetables, but will devote themselves mainly to the raising of stock. Almost any fruit grown in England should do well, though shelter from occasional high winds would be a necessity; but since eucalyptus, black wattle, and other trees have an abnormal growth—as much as 10 feet in a year—in the highlands of the protectorate, this shelter could be provided, and would in itself return a good profit in a country where its geological structure precludes the probability of the existence of coal deposits. Plants susceptible to the influence of night frosts are out of the question, except, perhaps, to the north of Mount Kisimachanga, where the ground slopes down to an altitude of about 4000 feet. I was unable to get so far myself, so cannot give an opinion on that point.

It is probable, then, that the industrial future of Guas Ngishu will in the main be the direct and indirect outcome of the forest—indigenous and planted—and of pasture; rough timber, and live cattle at first, and eventually, no doubt, the carpenter, the cabinetmaker, the tanner, the canner, and other craftsmen will supplement the population. Admittedly the two essential conditions to progress are the existence of markets at which to dispose of produce, and lines of communication to facilitate the carriage of goods to those markets. The so-called absence of markets, so often introduced both by governments and individuals as an excuse for neglecting opportunities, appears to me to be an exaggerated argument which should be banished from the mind of the would-be successful colonizer. By the time a colony has reached even

the early stage of development, of which East Africa is at present an example, a local market already exists capable of purchasing on good terms all that early industry can produce. My invariable experience has been that, in young colonies, to buy such "luxuries" as vegetables, fruit, eggs, or fresh butter, one has to pay such a price as would cause the English housekeeper to open her eyes, and that such staple articles as wheat have a trebled value. And all this time inferior substitutes are being imported. In the mean time, scores of men roam about the country, trading with natives, shooting, or looking for gold or precious stones, and, in fact, doing everything but attempting to develop the land surface, which is a finer asset than all the undiscovered goldfields in the world, for in agriculture and pasturage there lie the means to establish and support a large, distributed, and increasing settled population. As this grows, so does the local market. As the local market grows, fresh settlers pour in; the development of industry expands; surplus production is no longer a negligible quantity; the railways, in their own interests, lower their rates and open branch lines as the volume of trade increases; shipping companies compete with one another for a carrying trade now worth catering for; and thus step by step the conditions now existing in East Africa are substituted for those applicable to the Western States of America and some of our own older and more distant colonies, which can place wheat and other produce on the home market at prices not quite convenient to the home producer.

It is instructive to compare the trade-routes to England from the Western States and up-country East Africa respectively. In the former case, produce is carted to the nearest railway station, sometimes many miles away; it travels some 3000 miles by rail to an eastern port, is shipped, and a further 3000 miles sees it in a British port. East Africa produce will, on an average, travel one-eighth the distance by rail and three times as far by sea. Taking the relative cost throughout the world of land to sea transport, and all other conditions having by the process of competition become equal, the balance lies distinctly in favour of East Africa, and it must be remembered that, in spite of certain drawbacks, the tropics are much more productive than the temperate zones.

But there is another proposition which struck me forcibly when I passed down the Nile from Uganda to Egypt five years ago. That great river is the natural outlet for Uganda and north-western British East Africa, and, with engineering enterprise and expense quite trivial as compared with what has already been done in Egypt, can be made navigable from Lake Albert to Upper Egypt. Indirectly and directly, Sir William Garstin's great scheme for the canalization of the Nile from Bor to Fashoda should do much for these protectorates. Firstly, it will save the millions of gallons of water continually evaporating in

the sudd expanse, and thus swell the river to such an extent as will probably give to the lower Nile an increased volume even after the demands of irrigation have been met. This may suggest to the Egyptian Government the economic advantages of a navigable waterway through the cataract district to the Mediterranean. Secondly, this great work will so vastly widen the area of cultivation as to re-establish Egypt as one of the world's great granaries. With the establishment of this new era, Mediterranean sea-freights will become proportionate to those on the Atlantic, and Uganda will share the advantage with Upper Egypt—for a journey a few days longer in a Nile barge will not materially add to expense in transit.

Before the reading of the paper, the PRESIDENT said: The Fellows will, I am sure, welcome the presence on this platform of Major Gibbons, who has given us more than one valuable address. The last occasion, if my memory serves me right, was some five years ago, when Major Gibbons placed before us the geographical results of his extensive explorations in Barotseland. You may remember that he received high encomiums both from our recent President, Sir Clements Markham, and from other Fellows of the Society, in respect of the thoroughness of his work. It was, therefore, no surprise to us to learn two or three years later that he had been selected as the most suitable available person, unconnected with and independent of the administration of East Africa, to go to the Guas Ngishu plateau and report upon its prospects as an outlet for the Zionist movement, or perhaps I should now say, the Jewish Territorial Organization. The general principles underlying that movement probably command the sympathies of most thinking persons in our liberty-loving land, although, naturally, there is considerable division amongst us, just as there is amongst the Zionists themselves, as to the particular direction which their energy should take. I have referred to this subject because it is a question of the moment, so that it lends a special and immediate interest to the paper of the evening, apart from the general interest which the Royal Geographical Society must always take in the development of an unsettled region, and especially if that region falls within the circle of the British Empire. And if any one should feel inclined to suggest that the particular subject to which I have referred does not come strictly within the purview of geography, I would plead that geographical science, which has borrowed so much from, and has lent so much to, various other departments of human knowledge, cannot afford to dissociate itself from sociological or ethnological questions, or indeed from any questions which relate, even remotely, to the reactions between mankind and the elements and forces of its environment. I now invite Major Gibbons to read his paper.

After the paper, the PRESIDENT said: We are so fortunate as to have with us to-night perhaps the highest authority on general questions connected with East Africa. I refer to Sir Charles Eliot. I know that he has pledged himself to deliver an address elsewhere on this subject to-morrow night, and it would not be fair to ask him to encroach too much on what he is then going to say; but I have no doubt he will be able to give us a few interesting observations out of the wealth of his knowledge of the country in question.

Sir CHARLES ELIOT: I have listened with great pleasure to the very interesting paper which Major Gibbons has read. I know something of the part of Africa with which he has dealt. I have made two journeys in it myself, one

from Mumias on the Uganda side, and another from the Sirgoit rock on the east to Nandi Boma, and then down to the plains which in part cover his route, and I can quite endorse all that he said about the beauty of the country. The view over the Kerio valley of which he spoke is one of the most striking, as far as my experience goes, in the world. I could not quite understand from his account whether I saw it from the same point he did, but the distance cannot have been great. When near the Sirgoit rock, we were told that there was a fine view to the east, and I went from the plains through a forest, with some uncertainty as to the road. We wandered about in this forest for about two hours, wondering when we should get out. The foliage was so thick that we seemed to be in twilight all the time, and all of a sudden, just as we were giving up hope, we came through a sort of gateway on to a ledge of grass looking over a valley about 3000 feet deep, and something between 20 and 30 miles wide. The bottom of it was spread out like a map, in which one saw the Kerio river taking its way to a lake. The sides of it were partly carved into the most fantastic spires and domes like those of a Gothic cathedral, and partly spread out in grassy ledges on which there were native villages, and I should doubt if in any part of the world one would find such an extraordinarily wide view with so striking a combination of green vegetation and grey rock and waterfalls springing out of the rock.

As for this plateau itself, it is a very curious place; it seems to have all the qualities which should ensure inhabitants, and yet it is at present absolutely uninhabited. Major Gibbons alluded to the obscurity of the history. So far as we can make out, it has been occupied within fairly recent times, that is to say, within a hundred years, for one cannot get any dates out of native memories in East Africa. But in that time there have been two races, of one of which nothing is left except the remains of low-walled stone dwellings. Those people were apparently not Masai, and they must have been a very unusual race in East Africa, for builders in stone there are extremely rare. I know of none except on the Guas Ngishu, and some tribes on the banks of the Nile who use stone for the lower part of their huts, though not for the superstructure. These people were, according to native traditions, driven out by the Masai. The Masai of the plateau, who probably came from the north, involved themselves in a battle with another branch of the Masai who lived to the south, and got the worst of it; and while they were engaged in this conflict, the Nandi destroyed all that remained of them on the plateau. From that time it has been uninhabited, since the Nandi preferred forest land, and the Masai, who preferred open country, had been exterminated.

I was very glad indeed to hear that Major Gibbons had formed such a high idea of the capabilities of the Guas Ngishu plateau, because I must say that I myself never thought it was one of the best parts of East Africa. And if he thinks so well of what I should have said was a somewhat distant part not presenting the greatest advantages, it augurs well for the verdict which will be passed by travellers on the whole of the country. I entirely endorse what he says as to the importance of the highlands of the East Africa protectorate. It is a regrettable thing that so little attention has been paid to them in the past, and I hope that in the future the very great possibilities which they possess for European colonization will be recognized. It is not only a country where Europeans can live comfortably, but it is a singularly beautiful and attractive country. Of the many people who have visited it, I do not think any one has brought back any other impression; and the most recent statistics that have been published seem to indicate that it is progressing favourably, commercially and economically, and I trust that it will in a few years prove to be, not only one of the most important parts of Africa, but also a very important part of the British Empire.

Colonel W. H. Broun: I have not been on the plateau; I have only seen it at a distance from the railway going up. It is certainly a very beautiful-looking country, and the photographs I have seen resemble other parts of the protectorate, and they remind one very much of Scotch moor or Cumberland fell. It is a very fine land, and I have no doubt that it will be a country in which cattle will thrive extremely well; but at present a good deal of what is going on will not, I think, prove to be beneficial to the country.

The President: The hour is now so advanced that I think we must propose and carry our usual vote of thanks to the lecturer.

RECENT ANTARCTIC EXPEDITIONS: THEIR RESULTS.

By Dr. G. Von NEUMAYER.

At the seventy-seventh meeting in Meran of the Society of German Scientists and Physicians, a paper was, on September 26 last, read by Dr. von Neumayer on the results of south polar expeditions during the last eight years. Recapitulating the results of recent Antarctic expeditions, Dr. von Neumayer emphasized the recent English expedition. Between them Captain Scott and Captain Colbeck had laid down the lines on which all future Antarctic expeditions must proceed. To them geography owed the establishment of the method of geographical exploration in extreme southern latitudes. The enormous distances covered by Captain Scott and his bold fellow-adventurers dated a new departure in the history of Antarctic discovery. Not only had the conception of the physical features of these regions been rectified and widened, not to say, revolutionized; the ice-wall, hitherto viewed as an insuperable barrier to further advance, had been overcome and rich spoils secured. Leaving winter quarters, November, 1903, Captain Scott climbed the glacier valleys up to a height of over 9000 feet above sea-level, and to a distance of 300 miles from the station. In a latitude of 77° 59′ S., the adventurers in sledges penetrated to as far as 146° 33′ E., on the south side, namely, of the hitherto accredited site of the Earth's magnetic pole. They must, therefore, have crossed the isogonic line where the north end of the needle pointed to the geodetic terrestrial pole. This was an accomplishment of highest value in the cause of terrestrial magnetic research, and science might well with strained expectation await the communication of the values thence obtained. Equally interesting was the determination that under lat. 84° S. a mountain rose to a height of 15,000 feet, Erebus and Terror having hitherto ranked as the highest heights of the Antarctic Regions. To that mountain was given the name of the indefatigable promoter of south polar research, Mount Markham. Another discovery of much promise was that under lat. 80° S. Scott's expedition found remains of fossil plants—a discovery likely to be of great consequence in its bearing on the Earth's climatic changes. Thus was the vast domain

stretching south of the polar circle, from 160° E. to 160° W., all at once made known to us in various aspects to an extent exceeding the fondest expectations. Of much importance for future exploration was also Captain Colbeck's determination that the pack ice must be worked through early in summer in order to reach open water. This should settle once for all, as a general rule, *mutatis mutandis*, the season of the year suitable for such expeditions. In respect of the clearness and transparency of the weather, Lieut. Royds gave interesting, if not completely new, communications. His observation how day after day they had glorious sunshine day and night was worthy of special attention.

Passing next to the expedition in the Weddell region, Dr. von Neumayer pointed out how the Belgian expedition, the first to winter within the Arctic zone, was also the first to report the winter temperatures in high southern latitudes. The extensive oceanographic surveys and topographic measurements carried out by Lieut. Lecointe during the voyage in the archipelago south of South America, and more particularly in the icefield, made the Belgian one of the most interesting and valuable expeditions ever conducted in the Antarctic. The numerous drawings made, embodied in comprehensive maps, were of great service in the way of threading the medley of straits, bays, and islands, while the passage in the icefield to Alexander I. and Peter I. islands would always be prized as a memorable event, yielding a rich booty of experiences as to ice in the Antarctic. The numerous and excellently executed maps issued by the Belgian expedition attest how well the staff accomplished its geographic mission. As to the physical department of its labours, the short monographs, those by Dr. Arçtowski, *e.g.*, justify us in expecting contributions to science of radical value, when once the results of this expedition have been given in full to the world. The region south of Cape Horn and beyond lat. 60° S., already worked by Ross, D'Urville, Bransfield, Biscoe, and recently by Larsen, Hovgaard, and Dalmann, was by the Belgian expedition afresh explored. Though, no doubt, many corrections, topographic and geographic, would yet be made, nothing essentially new respecting the configuration of the archipelago still awaited discovery.

The meritorious expedition of Dr. Charcot with the *Français* effected rectifications here and there, while its wintering on the Wandel island in the neighbourhood of Biscoe islands yielded some new climatic data. It was, withal, very remarkable that during his stay there Dr. Charcot could make no observation of the aurora Australis any more than did the Belgian expedition.

The course of the Belgian expedition, modestly equipped as it was, was on the whole fortunate, though it cost the life of so accomplished and promising a savant as Lieut. Danco. On the most varied fields of science it gathered in important fruits, as substantiated by the highly

valuable publications it had already issued. From the Belgian school, again, proceeded such tried and able men as Roald Amundsen, who now in the northern ice was penetrating to the Earth's magnetic pole.

In the Weddell quadrant (to quote Markham) the Swedish expedition under Dr. Nordenskjöld had reaped a brilliant harvest. The intrepid explorer had discovered and determined in the Western Antarctic King Oscar Land. Passing two winters, with Snow hill near Seymour island (64° 22′·5 S. and 57° 9′ W.) as a centre, the expedition succeeded in maintaining communication with the civilized world by means of the ship *Antarctic*. Captain Larsen, well-known expert in ice voyages, made successful runs between the Swedish winter station and the Falkland islands, but yet lost his ship in the ice at Paulet island (63° 35′ S. and 55° 52′ W.), where in 1903 the shipwrecked wintered, making valuable observations respecting weather and ice. Attempting to penetrate further south towards the middle of the Weddell sea, the *Antarctic* made a large collection of hydrographic and oceanographic measurements. The soundings in this region, taken in conjunction with those carried out by Bruce, were of very notable value by way of completing the knowledge of the relief of the floor. In a number of sledge journeys, Nordenskjöld and his fellow-explorers fixed the position of Graham Land and Oscar Land. The winter season was turned to best account in instituting meteorological, magnetic, and other geophysical observations and surveys. Dr. G. Andersson, who in the Falkland islands had been making geographical and physical observations, as also geological investigations on the west coast, induced Captain Larsen to visit the island of St. Georgia. To Dr. Andersson's studies we accordingly owed an enlargement of our knowledge of this lonely island in the South Atlantic ocean, examining as he did the state of the German observatory set up there 1882–83: he found them greatly damaged by wind. From St. Georgia the passage was made to Graham Land and Nordenskjöld's station. Happily, before the shipwreck at Paulet island, Andersson and his two companions disembarked, pushing their way on to Snow hill with sledges and snowshoes. This memorable journey yielded valuable surveys and observations. In Louis Philippe Land the travellers made an extremely estimable supplement to Nordenskjöld's labours in Snow hill, and Larsen's in Paulet island. By reason of the distances separating the investigators, the data they collected were especially instructive meteorologically.

Once the very comprehensive materials were sifted and reproduced in maps, the discovery of Crown Prince Gustav channel and its topographic relation to Gerlache strait and Danco Land, taken in connection with the explorations of the Belgian expedition, Dr. Charcot's expedition and his wintering in Wandel Island, would prove quite an epoch in geography.

The Scottish National Expedition, penetrating to 72° S. and 17°

W., and mapping 150 miles of the coast of the discovered Coats land, had not only done good service by penetrating the Weddell sea and instituting a valuable series of soundings, but had enriched science by establishing an altogether different representation of the floor-relief of that sea. Attaching itself on one hand to the labours of the German ship *Valdivia*, and on the other to the labours of the Swedish expedition, the Scottish expedition furnished important fixed points towards a general conception of South sea soundings. It was gathered that a submarine ridge extended in the form of a curve from Madagascar to Bouvet islands, and from Bouvet islands to the Sandwich group. Thence, in Bruce's opinion, there was a fork-like connection, on one hand, through the South Orkney islands with Graham Land, and on the other, through South Georgia with the Falkland islands and the South American continent. Thus Bruce's oceanic labours tended to effect an essential transformation in our views of the floor-relief of the South Atlantic and South Indian ocean. The 6000 fathoms' depth of water sounded by Ross in 68° 32′ S. and 12° 49′ W. were, by the thorough experiments of the *Scotia*, cancelled—a fact carrying with it a complete recast of our views of the Weddell sea. Of no small service, moreover, to science was it that the physical station in Scotia bay (60° 44′ S. and 44° 50′ W.) was to be maintained in permanence. The interesting map accompanying Bruce's publications included the coast claiming to have been found by Morrell, and the existence of which had been much called in question. The achievements of the Scottish National Antarctic Expedition were also attained at a small expense of means. By its investigations, and those of Gerlache, Charcot, and Nordenskjöld, supplemented by the further observations of the Copland observatory, a foundation had been laid for determining the meteorology of the Weddell sea region.

In the Enderby region south of Kerguelen was the field of the German Antarctic Expedition under von Drygalski, in the ship *Gauss*. Its activity was essentially limited to the east of the region, in the neighbourhood of the south polar circle, where Wilkes's expedition ended, and Termination Land was mapped. Since in 1874 the English *Challenger* had crossed the polar circle at 80° E., nothing had been attempted in that region, except what was done in 1899 by the German ship *Valdivia*, of the Deep Sea Expedition. The existence of Termination Land was rendered more than doubtful by the investigations of the *Challenger*, and was, by the German expedition, proved to be on the side of Wilkes illusionary, while on the other side of the quadrant Enderby Land, nearly connected, if not identical, with Kemp Land, may be considered as tolerably well ascertained, and to be rightly laid down in the maps under the south polar circle. Having in the autumn of 1901 erected a station on the Kerguelen islands as basis for observations in the high south, *Gauss*, on January 31, 1902, left Kerguelen and reached,

without crossing, the polar circle at 90° E., where the ship was frozen in. At a distance of 100 kilometres therefrom was found firm land, to which was given the name of Kaiser Wilhelm II. land. A mountain there, rising inside the polar circle to a height of 1220 feet, was named Gaussberg. Surrounded by ice and snow, an observatory was erected for geographical and magnetical observations. Sledge journeys of limited range were carried out. Magnetic, meteorologic, and geodetic observations were diligently gathered in. The structure and movement of ice were especially studied. Biological, geological, and botanical work was zealously pursued. At length on February 8 there was promise of relaxation of ice, and the machine was set in motion for freeing the ship of its gelid chains. In spite, however, of every effort, the ship was eventually borne by the current and the ice in a northerly direction. By the end of March, 1903, all hope of southerly sailing had to be abandoned. On April 12 the ship, in 59° 30′ S. and 71° E., sighted the last iceberg. Thereafter it made for the south African coast, whence was sent the first intelligence of the course of the expedition. To break ground is the great problem of the exploration of the Enderby region, where indisputably Wilkes did see firm land, on which, however, it was impossible for him to set foot any more than it was possible for him to penetrate further south or west, where, too, the *Challenger* was unable to press further east; and where, moreover, according to Fricker's investigations into the ice of the south polar zone, different ice-currents met, accumulating enormous ice-heaps.* Such task experts deprecated the German expedition from attempting to penetrate towards the south pole, especially at so advanced season of the year. It was therefore proposed by the president of the German South Polar Commission, to attack the Enderby region from the basis of the Kemp-Enderby Land. Thence, in all circumstances, the ship could cross the south polar circle, and ascertain the nature of the land-masses in that quarter, whether islands, according to Morrell, or the northern outspurs of a continent. It is far from me to assume the part of critic; it is enough to demonstrate how the problem of the Antarctic Regions south of Kerguelen has been left unsolved.

In conclusion, may I cast a glance at the problems still awaiting

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* Fricker in 'Antarctis' (Berlin, 1898), pp. 171, 172; and in 'Ursprung u. Verbreitung des Antarctischen Treibeises' (Leipzig, 1892), p. 106. "The second reference that the *Challenger* observed a current making straight to Heard island might be read in the fact that the southern branch, gradually taking a more easterly course at about 62° to 65° S. and 95° to 100° E., encountered the approximately parallel current making west and north-west for Wilkes Land, thus producing a block. This would account for the collection of masses of pack-ice which here, almost at the very same spot, kept back Cook, Wilkes, Moore, and Nares from proceeding further south, west, or east." In their several reports are testimonies to this effect. Bellingshausen, too, at 85° E., had, on account of the ice, to give up hope of making eastwards or southwards, and was obliged to steer his course to Sydney.

solution? I would here lay emphasis on the fact that the exploration of the Enderby region, with basis of a station to be erected on Kemp-Enderby Land, must be taken in hand at an opportune season of the year. Thereby is not meant that the passage should be made by steering from west to east, but, if possible, from the west of Enderby region southwards (see Neumayer, 'Auf zum Südpol!' pp. 347–351). Whether it were possible (see *Challenger* 'Report of the Scientific Results of the Voyage of H.M.S. *Challenger* during 1873–6,' Narrative, vol. 1, part i. pp. 407, 408 and ff.) to thence attain a high southern latitude may be conjectured, but it were arrogance to make a definite assertion. Probably the southern continent, on which, too, the German expedition was at work, stretches further to the west than was originally assumed. Above all, it would be of service, proceeding from the west, to define towards south the boundaries of the continent.

Another region of the Antarctic, as good as wholly unknown, stretches from the meridian of Edward VII. Land, *i.e.* 150° to 105° W., to the domain named where the Belgian expedition reaped its brilliant results. Here are no fixed points to serve as a basis for further exploration. Cook and Biscoe here successfully sailed long stretches from east to west, while Bellingshausen sailed from 65° S. and 160° E. eastwards to Peter I. and Alexander I. islands, discovered by him. Cook and Biscoe, in their time, made important observations on the ice and the weather, but announced thence no trace of land. Here exploration might be most appropriately pursued on King Edward VII. Land, and an attempt might be made to follow the course of the coast further to the east, an attempt which, at a favourable season and with a strong steamer, might have some promise of success in it. If in the summer season of the southern hemisphere the winds should be taken as determinative, it might yet be possible, according to earlier experiences, to proceed from east about the basis of Biscoe island to the west. In our time, however, when steam-power is available, there are other things than the direction of the winds to be taken into account for such exploration. The importance of geographic exploration in so extensive a field of the Antarctic cannot be too highly rated, and its exploration is, especially in a geographical respect, a desideratum of the very first rank.

Much in want of investigation is also the region south of Bouvet islands, namely, between Enderby and Coats land, a region the investigation of which could be most suitably connected with the Kemp-Enderby group of lands. Here is a highly interesting problem to solve, and a very sensible gap within the Antarctic circle to fill up.

Not to attempt anything like an exhaustive enumeration of the problems still awaiting solution in the Antarctic, let me urge the prosecution of exploration in the spirit which has animated the expeditions just closed, and so we may hope to see lifted more and more

the veil over the great southern land. Apart from the great problems of meteorology and magnetism, the discovery by the British expedition of fossil remains (dicotyledons?) in the highest southern latitudes, as already discovered in high northern, opens the prospect of a solution of the question of climatic changes—a solution which might, perhaps, be found on the basis of an answer to the "Equatorial problem in palæontology."

Besides their service of geography, all the expeditions enumerated have devoted marked attention to the geophysical sciences. On the occasion of the German Geographical Congress at Danzig, we were fortified with a view of the compass of geophysical observations comprehended in the scope of the work of the German South Polar Expedition, and it was impossible not to admire the zeal and conscientiousness with which their scientific plan of research was carried out. But, indeed, in all the expeditions, all branches of geophysics, meteorology, terrestrial magnetism, seismology, and geodesy were worked with equal zeal and insight. The scientific world may, therefore, well await with strained expectancy the publication of the complete results of the expeditions, and all the more that, in consequence of international adjustments of work, a complete unity of results may be relied on.

THE RIVERS OF CAPE COLONY.

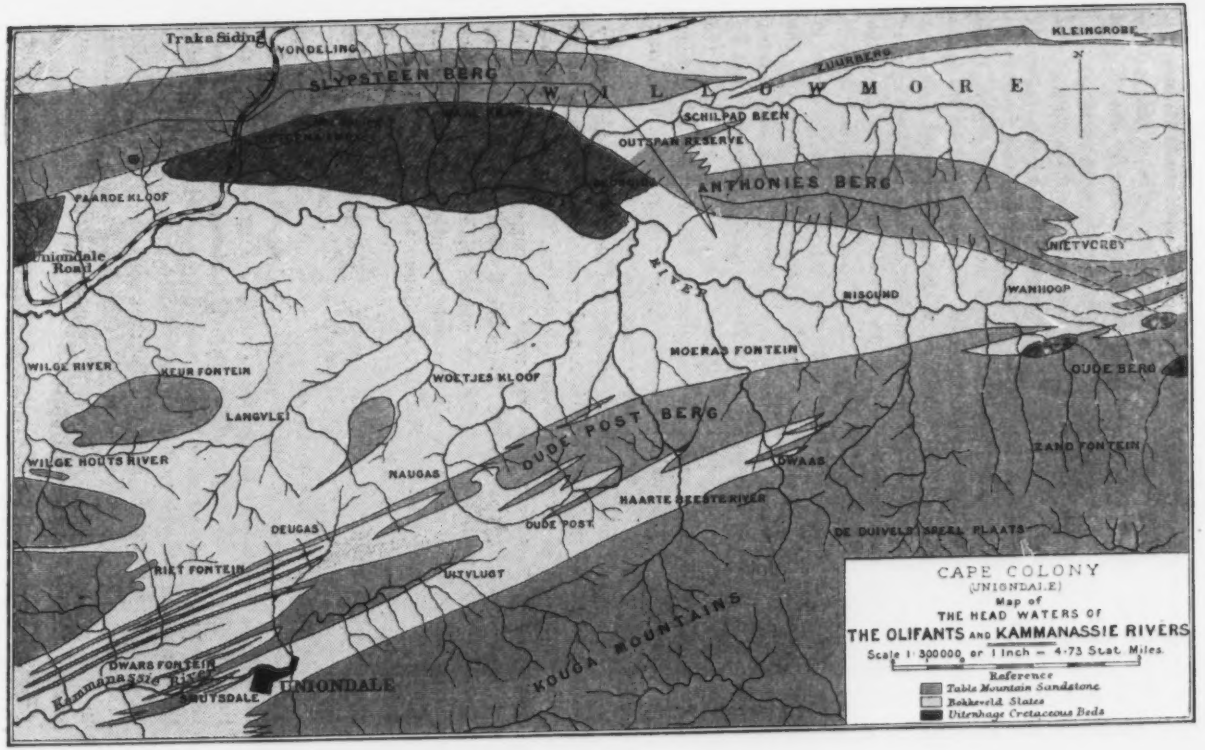
By Prof. ERNEST H. L. SCHWARZ, Rhodes University College, Grahamstown.

THE number of books and papers dealing with the geology of South Africa has become so great that a layman would suppose that we geologists must have a very good idea of our country. This is not the case, for the literature is mostly about details which have as yet no place in a general whole, and the fact that most of what is published appears in the form of Blue-books has raised a tendency to decry generalizations. For this reason very little has been written on the river-system of South Africa, because, to begin with, one must reconstruct the sub-continent and trace its condition when the rivers first began to flow. We have, therefore, no well-studied basis on which to build our arguments, and the arrangement of the land surfaces at the time of the installation of our river system which I shall adopt in the present paper must be understood to be an attempt to group facts as they have presented themselves to me, and not a statement of facts about which there is any body of consensus to appeal to.

If we draw a straight line from Cape Town to near Delagoa bay, we shall find that to the northwards of it there is a regular succession of river-channels originating from it, and to the southwards of it there is exactly the same condition of things, except in the area occupied by

Basutoland, where there is a displacement. The existence of a perfectly straight watershed is almost literally true, for the encroachments on either side are very slight. If we look more closely at the Basutoland area, we shall find that the Drakensberg mountains form a secondary watershed, from which, on the south, the rivers flow as from the main watershed, but to the north the rivers flow parallel to the main and secondary watersheds for some distance, and then join together as the Orange river and flow across the main watershed. This break in the line is the only one which occurs between Cape Town and Delagoa Bay.

I cannot conceive of any explanation for such an arrangement, except that which assumes that there was a vast plain stretching over the whole land when the sub-continent first rose from the water's edge, and that the central ridge was already then formed. If we examine the central parting of the waters, we find that there is no structural cause for its existence; there is no backbone of igneous rock, nor is there a chain of folded mountains to account for it; neither, again, is there a wide anticlinal arch, for the beds dip in towards it. I have adduced reasons elsewhere for supposing that the watershed owes its origin to the manner in which the Karroo sediments were laid down: they were accumulated on the thickest deposits about 150 miles from


Traka Siding
VONDELING
SLYPSTEEN BERG
KLEINGROBE
ZUURBERG
WILLOWMORE
SCHILPAD BEEN
OUTSPAN RESERVE
ANTHONIES BERG
PAARDE KLOOF
Uniondale Road
NIETVOREY
RIVER
RISGUND
WANHOOP
MOERAS FONTEIN
WILGE RIVER
KEUR FONTEIN
WOLTJES KLOOF
OUDE BERG
LANGVLEI
DUDE POST BERG
ZAND FONTEIN
WILGE HOUTS RIVER
NAUGAS
DWAAS
HAARTE BEESTE RIVER
DEUGAS
OUDE POST
DE DUIVELS SPEEL PLAATS
RIET FONTEIN
UITVLUGT
KOUGA MOUNTAINS
DWARS FONTEIN
Kammanassie River
SOUTSDALE
UNIONDALE
CAPE COLONY
(UNIONDALE)
Map of
THE HEAD WATERS of
THE OLIFANTS AND KAMMANASSIE RIVERS
Scale 1·300000 or 1 Inch = 4·73 Stat. Miles.
Reference
Table Mountain Sandstone
Bokkeveld Slates
Uitenhage Cretaceous Beds

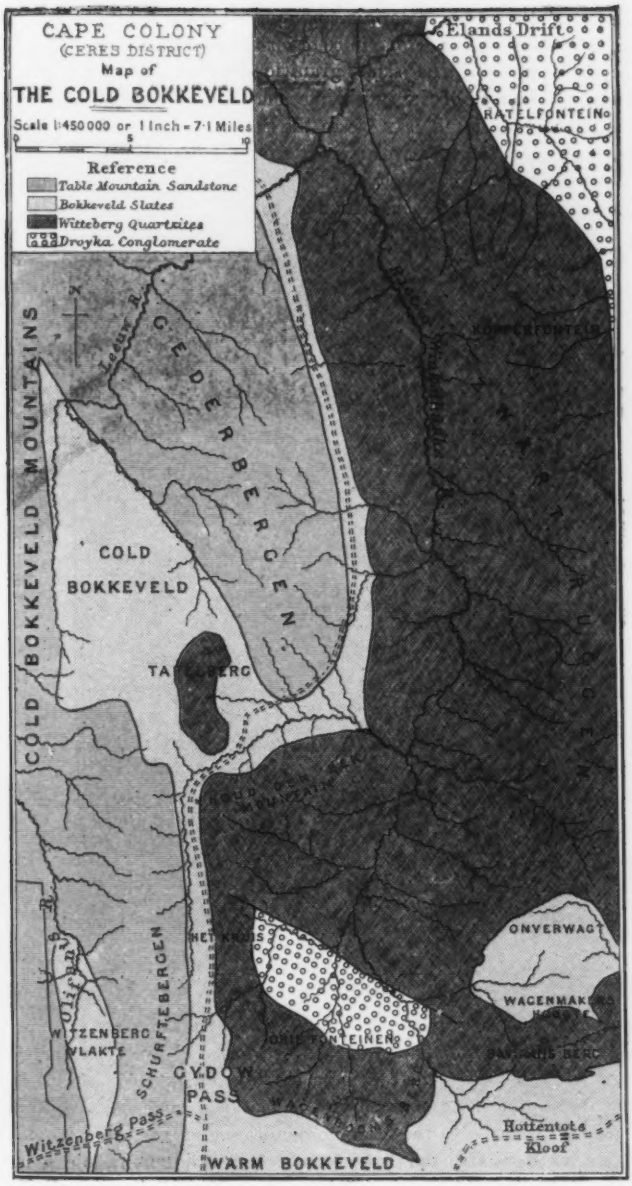
the old Permian shore-line, which ran north-eastwards to the north of the watershed. When elevation began, the curvature of the basin in which they were lying was reduced, and consequently the thickest deposits formed an elevation, which at once became a water-parting.

This original plain was about on a level with the main watershed as it exists to-day, for I have seen evidence elsewhere of the extremely little erosion that takes place on a flat water-parting, and roughly we can say it is so now at an elevation of 6000 feet above sea-level. Little isolated patches of flat ground along the watershed still testify to the existence of this peneplain, beginning with the Nieuwveld mountains on the west, and followed by the Snieuwbergen and the high country round Middelburg and Steynsburg. From here the country above the 6000-feet level takes a bend round the secondary watershed through the Stormbergen and Drakensberg mountains; the main watershed in the Orange River Colony never rises to the 6000-feet level. On the north, the Witwatersrand shows evidence of having once been connected with the peneplain, although it fails to rise to the 6000-feet level by some 300 or 400 feet. On the south, the sharp crests of many of the folded mountain ranges cut an almost level sky-line at elevations from 4500 feet to 5500 feet, and I am now inclined to regard them as having also participated in the formation of the peneplain.

At one time I held that the mountains had been folded subsequently to the rivers, and that they had risen, and were rising, gradually across the channels of the rivers; whereas my colleague, Mr. Rogers, held that they began to flow when their tops were still buried. Our conception of the plain-formation in South Africa has been of very slow growth, and for many years we had only the coastal plain, elevated 600 feet above sea-level, to guide us. It was only recently that, working on the watershed between the Souritz and Samtoos rivers, we obtained evidence of a widely spread plain elevated 4000 feet above sea-level, and therefore the additional 2000 feet—to bring the whole country under a peneplain—became no very great mental effort to conceive.

Originally this 6000-feet peneplain was not interrupted in the Basutoland area; it was only subsequent to the surface being laid dry that a great range of volcanoes was developed, and the vast accumulations of tuff and outpourings of lava, which now make up the Drakensberg mountains, were thrown across the river-channels, dammed back the water, and forced it to flow across the main watershed.

Here, however, there is matter for controversy. The lavas of the Drakensberg lie on a deposit called the Cave Sandstone. Is this latter an ordinary sediment, or is it a tuff poured out like the incandescent mud from the Soufrière in St. Vincent? Primarily the Cave Sandstone is made up of grains of quartz, with large quantities of felspar and other detritus from granite and crystalline schists. Underlying the Cave Sandstone and the transitional "Red Beds," there are the Molteno Beds,


CAPE COLONY
(CERES DISTRICT)
Map of
THE COLD BOKKEVELD
Scale 1:450000 or 1 Inch = 7·1 Miles
Reference
Table Mountain Sandstone
Bokkeveld Slates
Witteberg Quartzites
Dwyka Conglomerate
Elands Drift
RATELFONTEIN
COMPERFONTEIN
COLD BOKKEVELD MOUNTAINS
CEDERBERGEN
COLD BOKKEVELD
TAFELBERG
ONVERWACHT
WAGENMAKERS HOOGTE
WITZENBERG VLAKTE
SCHURFTEBERGEN
GYDOW PASS
PAARDENBERG
Witzenberg Pass
Hottentots Kloof
WARM BOKKEVELD

made up of the same materials, and undoubtedly sedimentary. Why, then, take the Cave Sandstone to be other than sedimentary? In the first place, tuffs made of the same granitic detritus have been described elsewhere. Instead of the tuff being composed of material derived from the shattering of liquid lava, as in the Soufrière hot mud and ordinary tuffs, these granitic tuffs are derived from the explosions which caused the openings through which the lava was erupted later on, and thus consist of the shattered rocks which go to make up the walls of the pipe.

KEYHOLE GORGE, ZAND KRAAL, BAVIAAN'S KLOOF, WILLOWMORE.

Secondly, the quartz grains of the Cave Sandstone are eaten into on the surface, and minute shreds of some talcose mineral penetrate the grain from the outside, giving the rock as a whole a chalky look. This is an effect that can best be explained by the material once being saturated with heated vapour. In the Molteno Sandstone, on the other hand, the quartz grains have still the dirt of their transit adherent, and a large number of them have new crystalline deposits of silica on them, as in normal sandstones, causing the rock to glint and sparkle in the

A KEYHOLE GORGE, SEEN FROM THE OUTSIDE—THAT IS, FROM THE VALLEY ERODED IN LOOSE UITENHAGE BEDS, KLIPFONTEIN, BAVIAAN'S KLOOF.

BAVIAAN'S KLOOF RIVER RUNNING IN TABLE MOUNTAIN. SANDSTONE BETWEEN TWO BASINS OF UITENHAGE BEDS.

sunshine. But the most cogent reason for considering the Cave Sandstone to have been poured over the land as a liquid mud is the fact that it forms banks 800 feet thick, without a trace of bedding or alteration of material. Sometimes there is a bed of volcanic ash intercalated, or a lenticular patch of mud crowded with remains of phyllopods and cockroaches, grasshoppers, and other land insects. Again, there is sometimes a pseudo-bedding, where the rock, on weathering, shows partings convoluted in such a manner that it looks as if the whole had been stirred round in a gigantic pot; or the solid 800-feet bank is broken across by a plane running slantingly through the mass at an angle which looks like the angle of repose of the material. Lastly, the limit of thickness, namely 800 feet, is the same as that of the Italian peperino, which was undoubtedly poured over the land as a liquid mud, and 800 feet seems, therefore, to be the maximum self-sustaining column of such material.

The age of the original South African peneplain was late Jurassic, and it had already risen 2000 feet before the volcanoes broke out in early Cretaceous times, and on the plains cut along the coast at sea-level, the Uitenhage beds were being laid down. There were subsequently torsional earth-movements which faulted down the Uitenhage Cretaceous beds into small fold-basins, then elevation, and again a sinking to the same level, which is now 4000 feet above the sea.

My reason for assuming that there is a 4000-feet peneplain belonging to two periods, before and after the deposition of the Uitenhage beds, rests on evidence I found in Baviaan's kloof. There there is a horizontal bed of Table mountain sandstone (Silurian), bent on the north downwards at an angle of 45°; resting on the dip-slope is a mass of Uitenhage beds inclined at the same angle, and cut off on top by a plain passing equally through the top of the horizontal Table mountain sandstone. How to interpret this evidence otherwise than by assuming two periods of base-levelling at about the same elevation I cannot conceive, but the two periods make it exceedingly difficult to grasp the details of the structure of the country.

The 4000-feet peneplain stretched over the greater part of the Cape Colony south of the main watershed, and at the time of its full development the rivers were very differently arranged from what they now are. As the land rose, however, the dominant trend of the rivers produced by the original 6000-feet peneplain began to assert itself more and more, and over the greater portion of the country little now remains to attest this earlier system. Even in the great displacement in Basutoland caused by the volcanoes, the coast streams are stealthily creeping inland, and will eventually capture the waters that now flow into the upper Orange river, and at some future date the original straight watershed will be restored in its entirety.

North of the main watershed there appears never to have been a

ZOETENDAT'S VLEY, WILLOWMORE. THE HILLS ARE CUT TO A LEVEL WITH THE 4000-FOOT PLATEAU; FORMERLY, THE STREAMS FLOWING FROM THEM ON THE NORTH RAN FAR OUT INTO THE KARROO, NOW THEY ARE COLLECTED BY A RIVER SHOWN BY THE ROW OF THORN TREES RUNNING ALONG THE BASE OF THE HILLS.

ENTRANCE TO MEIRING'S POORT; A RIVER STRIKING THE MOUNTAINS AT RIGHT ANGLES.

definite period of alteration of the river-system. The Orange river, carrying all the water from the north of the main watershed, is held up by a bar of granite at the Aughrabies falls, and the stages in the wearing away of the obstruction are represented by plateaux, or the remains of such, at various elevations on the north-west of the colony, and, I believe, in the Orange River Colony as well.

The most remarkable evidence of the river-system accommodating itself to the 4000-feet peneplain after being arranged for the 6000-feet level, is afforded by the Cold Bokkeveld. This tract of country lies north of Ceres, and consists of a narrow valley shut in with high mountains, the Cederbergen on the east, and the Cold Bokkeveld mountains on the west, the two running together on the north, and closing the valley in. On the south the valley widens out, and then closes in again; at the end there is an abrupt break, the Gydow pass, where there is a sudden descent to the Warm Bokkeveld, 1000 feet lower. Now, with a valley shut in by high mountains and open to the south, one would naturally expect that the rivers would course down the valley and out at the open end; but in reality the rivers take their origin at the edge of the precipice, run up the valley, and cut through the mountains at their greatest width. The explanation of this anomaly lies in the fact that the edge of the precipice—the Gydow pass—is part of the main watershed of the colony, and, faithful to the rule that, unless a volcano rises across the course of a river, no stream will violate this boundary, 2000 feet thickness of solid sediments have been carried out of this great valley without the waters being turned over the precipice into the Warm Bokkeveld, although a dam of only a moderate height at the north end of the valley would do so. This very remarkable example of a river being able to clear its course at a sufficient rate to allow for the sediments accumulating in its upper reaches to be carried away, is almost on the point of disappearing; there is evidently a very resistant bar at the mouth of the river that drains the valley, for the Cold Bokkeveld consists of flat marshy ground, whereas past the bar the river dashes down a series of cascades into the heart of the Cederbergen. If this bar does not give way in the next thousand years, the Cold Bokkeveld will drain south instead of north, unless a tributary of the Olifant's river, which has eaten back till it taps one corner of the Cold Bokkeveld, manages to secure the drainage for itself.

There is a phenomenon of a somewhat different kind exhibited in another Olifant's river—that which flows past Oudtshoorn into the Gouritz river. Both the Olifant's river and the Kammanassie river started level on the 4000-feet peneplain, each running west and draining equal areas; the Olifant's river, however, traversed the loosely aggregated deposits of Uitenage beds, whereas the Kammanassie flowed over a country consisting of hard slates and sandstones. Consequently,

MEIRING'S POORT; A RIVER CUTTING MOUNTAINS 6000 FEET HIGH, ITS BED NOT 1000 FEET ABOVE SEA-LEVEL.

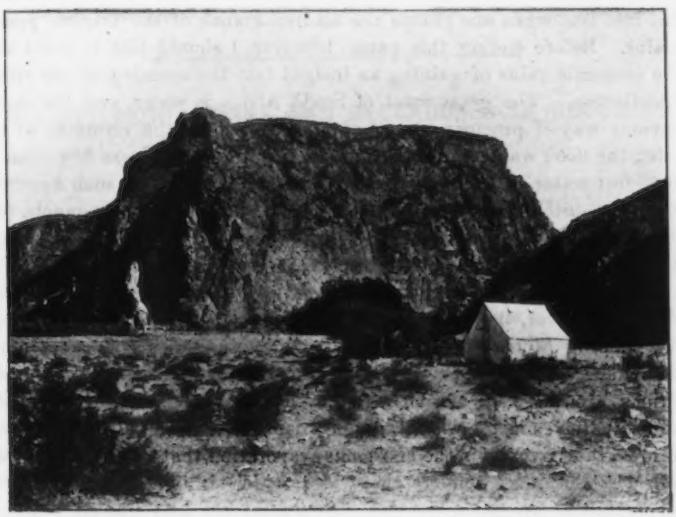
VLAKTE PLAATS, OUDTSHOORN; CREST OF THE ZWARTEBERGEN RISING TO A 6000-FEET LEVEL, WITH A 4000-FEET SHELF BELOW; ALLUVIAL PLAIN IN FOREGROUND.

the Olifant's river eroded its bed at a much greater rate than the Kammanassie, and the fall of the side streams in the former became greater than in the latter, till in time the drainage belonging to the top part of the Kammanassie river became transferred to the Olifant's river. East of Uniondale we see the continuation of the structural valley of Kammanassie river, but the side streams, coursing down from the mountains on the north, make for the centre of the valley as if to join the main river, then turn suddenly round and run back through the same mountain range into the Olifant's river, so that the streams have a course represented by the figure of a fish-hook.

In Baviaan's kloof, which lies to the east of the head of the Olifant's river, we find the effect of loosely aggregated sediments let down in among harder rocks exhibited in an extreme degree. The kloof is a wide valley between a double hedge of mountains, the floor of which is represented by the 4000-feet peneplain, still in good preservation. All the rock is hard quartzite belonging to the Table mountain series. In the centre there have been folded down a succession of narrow basins of Uitenhage (Cretaceous) beds. When the rivers took on their last stage of erosion, they rapidly removed the loose contents of these basins, and the streams draining from the mountains on either side were given a tremendous fall, so great, indeed, that they were only able to cut downwards. Being small in volume, the cleft they excavated was correspondingly narrow, and in this way, especially on the north of the fold-basins, a long succession of keyhole gorges has been produced. These are a hundred or more feet actually, with vertical sides, and the width, never much more than 30 feet, and often less, is preserved to the top. They are not due to any structural inequality of the rock, such as might have been produced by a fault, for the gorges wind about just in the same manner as a river would, and are, in fact, cut in the same channels now as when they first started on the 4000-feet level, which is now 1000 feet above their beds. Very few of the gorges have permanent springs in them now, and it is remarkable that these clefts, running into the heart of the mountains, should be dry.

Turning to the north of the folded mountain-bed, we have evidence of the 4000-feet plateau having extended northwards right to the foot of the Nieuwveld escarpment. The Karroo, as far as the drainage areas of the Gouritz and Gamtoos rivers is concerned, is divided into kopje veld and flat karroo. The former is cut out of the 4000-feet peneplain by the streams having a great fall, owing to the main artery, the Gouritz river, striking the mountain ranges on the south at right angles, and traversing them transversely in the direction of greatest erosion. The Gamtoos river, however, becomes entangled in the mountains, and its main tributaries have been forced to flow along the strike of the beds, or the direction of least erosion; consequently, the Gamtoos drainage area has barely been able to clear away the results of

NIEUWE KLOOF, WILLOWMORE, SEEN FROM THE TOP OF THE 4000-FEET PLATEAU. THE ROAD TO BAVIAAN'S KLOOF RUNS DOWN THE KLOOF IN THE CENTRE, AND BAVIAAN'S KLOOF IS THE DEPRESSED AREA TO THE RIGHT. THE ROCK IN SIGHT IS HARD TABLE MOUNTAIN SANDSTONE.



THE BOTTOM OF NIEUWE KLOOF, WHERE THE SLIDE KLOOF ENTERS THE MAIN VALLEY. THE FOREGROUND IS OCCUPIED BY UITENHAGE BEDS, THE LOOSE NATURE OF WHICH HAS ALLOWED RAPID EROSION. THE CLIFF IS A FAULT-FACE ABOUT 800 FEET HIGH.

weathering, and as a result the country round its headwaters has been levelled.

In the Gouritz river head-streams the original flow was southwards; then, at the time of the 4000-feet peneplain, it was northwards; but when greater elevation of the land took place, the old direction became more and more dominant. At first the rivers ran far out to the north, and then turned round and joined some of the larger streams flowing south, and gradually the northward course was shortened till now we find the streams running off the northern face of the folded mountains, making a very short excursion to the north, and joining the main arteries at the place where they enter the mountains, and sometimes even run through part of the mountains to do so. In the flat karroo, however, the downward erosion has not been so rapid, and we find the old northward trend of the rivers still preserved in the tributaries of the Salt river, north of Willowmore. At first sight it is not quite clear that these tributaries are the ends of streams that flowed north from the mountains, but if we look closely, we see that these rivers have been beheaded by the Traka river.

With the further history of the river-system when it flowed over a plain elevated 2500 feet above sea-level, and over others at elevations still less, I do not wish to deal in the present paper. My endeavour has been to bring out as clearly as possible the inter-relation of the old plateaux and the river-system; the minor details of the later plateaux fall into line when one grasps the all-importance of the original peneplains. Before ending this paper, however, I should like to point out the economic value of gaining an insight into the meaning of our river distribution. The great want of South Africa is water, and the most obvious way of procuring a supply is to dam up the rivers so as to catch the flood waters. If we remember that all our rivers flow from a 6000-feet water-parting, we can realize how impracticable such a course would be in the case of the greater number of our river-channels, for the short course and immense fall not only give terrific breaking power to the descending flood, but, the valleys being on such a slant, a very high dam-wall will impound only a small quantity of water. Where, however, there are remnants of the old peneplains preserved by the barring of the rivers, as, for instance, in the north-west of the colony and in the upper reaches of the Gamtoos river, then the conditions are more favourable for dam-making. In practice there is, unfortunately, a factor which prevents dams being a success in the areas of low-grade rivers, for the enormous evaporation that takes place in our half-desert country renders the water which is impounded unsuited for unskillful irrigation.

List of Works in which the River-system of South Africa is discussed.

Schwarz.—"Geological Survey of Beaufort West District," *Ann. Rept. Geol. Comm.*, 1896. Cape Town: 1897.

Rogers and Schwarz.—"Survey of the Country between the Karroo and the Laugebergen," *Ann. Rept. Geol. Comm.*, 1897. Cape Town: 1898.

———.—"Report of the Cederbergen and Adjoining Country," *Ann. Rept. Geol. Comm.*, 1900. Cape Town: 1901.

———.—"General Survey of the Transkei and Pondoland," *Ann. Rept. Geol. Comm.*, 1901. Cape Town: 1902.

Schwarz.—"Report on Matatiele," *Ann. Rept. Geol. Comm.*, 1902. Cape Town: 1903.

Rogers and Schwarz.—"Report on Beaufort West, Prince Albert, and Sutherland," *ib.*

Rogers.—"The Geological History of the Gouritz River-system," *Trans. S. A. Phil. Soc.*, **14**, p. 375. Cape Town: 1903.

Schwarz.—"The Volcanoes of Griqualand East," *ib.*, p. 98.

———.—"Geological Survey of Prince Alfred, Willowmore, and Uniondale," *Ann. Rept. Geol. Comm.*, 1903. Cape Town: 1904.

———.—"High-level Gravels of the Cape, and the Problem of the Karroo Gold," *Trans. S. A. Phil. Soc.*, **15**, p. 43. Cape Town: 1904.

Passarge.—"Die Kalahari." Berlin: 1904.

Rogers.—"Geological Survey of van Rhyn's Dorp," *Ann. Rept. Geol. Comm.*, 1904. Cape Town: 1905.

Schwarz.—"Geological Survey of the Long Kloof," *ib.*

Du Toit.—"Geological Survey of Aliwal North, Barkly East, and Wodehouse," *ib.*

Rogers.—"Geology of Cape Colony." London: 1905.

RECENT REGULATIONS AND SYLLABUSES IN GEOGRAPHY AFFECTING SCHOOLS.

By A. J. HERBERTSON, M.A., Ph.D.

Many educational boards have recently revised their regulations and syllabuses for geography, and their action is bound to have a considerable effect in improving the position which geography holds in the school curriculum, and also on the subject-matter which is taught as geography. Whether this healthy movement is or is not an outcome of the suggestions for drawing up syllabuses in geography recently issued by the R.G.S., stimulated by the correspondence in the *Times* and elsewhere which was reviewed in the *Geographical Journal* for January, 1905, it is a welcome one. Fortunately, the intelligent public is interested in the question quite as much as the educational authorities, and it is not surprising that these new regulations and syllabuses have called for editorials and letters, this time mainly in the *Morning Post*.

Three different groups of examination authorities have to be considered—(1) the Board of Education, which has the power of the purse, and therefore the greatest influence in shaping educational movements;

(2) the University Boards, which control the Local and Leaving Certificate examinations, and to a certain extent determine the preliminary training of those entering the universities, as well as professional and commercial life through other avenues; and (3) the Army Board and the Civil Service Commissioners, who determine the standard of education necessary for admission to the public service.

The Board of Education Regulations.

It is difficult to exaggerate the importance of the position now occupied by the Board of Education. The Board now demand, in their regulations for secondary schools, "a course of general instruction, including geography, and extending over four years." They recommend two hours' work in school and one at home every week. If every school sets aside this time for the teaching of geography, there is at last a chance for the teacher of geography to accomplish something in four years.

Each school desiring the approval of the Board for its course in geography should be prepared to submit a course providing—(1) An outline scheme dealing with the great land and water areas in such a way that on completing the course the scholars shall have gone through a geography of the World; (2) a suitably graduated series of exercises connected with the subject-matter of the course.

This is excellent, in that it gives every freedom to a schoolmaster to correlate the geography course with the other subjects of the curriculums, to utilize the local geographical conditions and interests, and to take some account of the special predilections of the teacher himself. That this is the case is precisely laid down.

"The Board desire to leave freedom and wide scope to schools with regard both to subject matter and methods of teaching, which should be carefully adapted to the special conditions existing in each case."

The provisions that the geography of the World must be gone through, and that each scheme must be submitted to the Board, provide against undue specialization or eccentricity. The second clause would be better for the introduction of "practical" before "exercises," understanding "practical" as involving all manner of exercises which the pupil has to work out for himself in field, laboratory, map-room, or library from data supplied to him.

Inspectors are asked to report—(1) as to the stage of instruction attained by the pupils on their entry upon the course; (2) the number of hours per week devoted to geography (two in school and one at home are recommended as a minimum); (3) as to the method employed by the teacher; and (4) as to exercises.

"Before admission to the course scholars ought to possess a general elementary knowledge of the great land masses of the World, the disposition of highlands and lowlands, the chief river-valleys, and the names

and positions of great countries and of a few of the chief towns in each. In addition, a more detailed knowledge of the geography of the British Isles should have been attained. Throughout the preliminary course great emphasis should have been laid on the interrelation of cause and effect. Scholars should possess, also, some knowledge of elementary physiography, including the Earth's shape, simple map-making, the compass; day, night, and the seasons; formation of mountains and rivers; the oceans; climate; minerals; plant and animal life."

If the Board can secure this they will have done a great service, and made it impossible to continue merely the old fact studying which did duty for geography. We fear that at present few pupils of twelve will be able to stand this test. The main fault of these preliminary requirements is the absence of any reference to human conditions other than political. The young child is much more interested in people, their plants and animals, their industries and modes of life, than in mountains or deltas or climate. The geographical teaching in early years should be concerned much more with human beings and their surroundings than with a logical presentment of so-called mathematical, physical, and biological geography on the lines of the text-book of physiography. The best logical order is not necessarily the best pedagogical order.

The methods employed by the teacher are to be such as "produce a vivid impression of connected facts through considerations, such as those of cause and effect and practical bearings of the facts selected."

An atlas is essential, but a text-book is not demanded where a teacher has special knowledge, and in all cases teachers are to bring the information up to date.

The school is recommended to possess wall-maps, globes, diagrams, relief models, specimen products, photographs, and a collection of county and detailed maps for references. It is a matter for congratulation that the Board are clear on these matters, for teachers find it hard to convince school authorities that geography can no more be taught without an adequate equipment than can chemistry or physics. A geographical department, whether in a school or a university, will always be one demanding as much, if not more, money than any other department. It would have been well had the Board said "strongly recommended," better still if it refused to recognize the geography teaching in a school which was not so equipped, after say two or three years from the publication of the recommendation.

The following recommendations on exercises, if interpreted in a liberal spirit, should yield good results. The difficulty will be to find teachers sufficiently well trained in geography to carry them out efficiently. "(1) *Questions and answers* (graded in difficulty from year to year) designed to elicit, through causes and consequences, subject-matter for entry in the scholars' note-books. No facts should be stated

without reasons; and the reasons are best expressed by the class itself. (2) *Notes and diagrams.*—Scholars' notes should not contain merely reproductions of lessons, but also worked-out problems together with original maps and plans. (3) *Mapping.*—Maps and diagrams should be regularly set, and in each case with a definite object, *i.e.* to illustrate a lesson from a particular point of view—physical, political, commercial, etc., no extraneous names or signs being inserted. Scholars should be required to justify each name, etc., inserted. (4) Field-work, excursions, factory visits, and the like may occasionally be used with good effect."

That the Board should recommend field-work and excursions is a great matter, for many teachers who have not tried them declare that it is impossible either to find the time for them or to carry them out with profit. Competent teachers who have tried them tell different stories.*

The Board append suggestions for a syllabus for a four years' course, which, like all syllabuses, can be very easily criticized. They, however, distinctly state that it is "given merely as illustrating one of the many ways of dealing with the subject-matter." The remarks already made apply to the preliminary knowledge expected. At present probably few pupils would possess it, and much of the first term, if not of the first year, might have to be devoted to giving it to them. With a better-organized scheme of instruction than that commonly followed, it is by no means too much to expect, provided that the human element is introduced and emphasized. Eight, however, is too early an age for systematic geographical lessons, which can hardly be profitably begun before ten. Before ten, local geography should come in as part of a nature-study course, and the information about foreign lands should be purely descriptive.

The four years' course suggested takes up the geography of Europe in the first year, of America and Africa in the second, of Asia and Australia in the third, and regional contrasts in the fourth. It has the merit of being geographical, but it hardly brings out the necessity for increasing the quality as well as the quantity of knowledge, nor is the human aspect sufficiently recognized. From the point of view of order of difficulty, the southern continents should certainly come before the northern ones, unless it be North America. It would probably be a good plan to begin any four years' course with a revision of what the pupils have previously learned about the World in general, as well as about the British Isles. The re-survey of the British Isles and the World at the end of the course is a valuable feature.

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* See the *Scottish Geographical Magazine* for 1897, the *Geographical Teacher*, *passim*, and numerous articles by Miss Dodd and many other writers in educational and other reviews.

Notes appended to the sample syllabus recommend that pupils should be taught the interpretation and use of Ordnance Survey and other maps. It would have been well to insist on this at the outset of the course. The cheapness of Ordnance maps for teaching purposes under the new regulations might have been mentioned. There is no excuse for every boy and girl in a secondary school not possessing at least the 6-inch or the 1-inch sheets of the school district.

The Board also suggest that "special lessons may be introduced in the course, *e.g.* in first year, the climatic phenomena of Europe as leading up to general principles; in second year, distribution of products, illustrated by American examples; in third year, effects of environment; in fourth year, geography applied to practical questions of the day."

The recognition of the principle of making geographical lessons geographical, and of introducing physical and other principles, if not already learned elsewhere, when they are needed, is a very important step in advance, though Europe is hardly the continent we should recommend for climatic investigations leading up to general principles.

The Board of Education's regulations are therefore to be welcomed as a substantial mark of progress. They can be criticized in details: the human element is left out in earlier stages, the order of presentation might be improved, the insistence on practical work in class-room and field might have been stronger; but on the whole they show a distinct advance on any previous official pronouncement.

Joint Certificate, Local and Leaving Certificate Syllabuses.

Oxford Local and the Oxford and Cambridge Joint Board syllabuses are practically identical. Each is divided into—A, General Principles of Geography; (*a*) Mathematical Geography, (*b*) Physical Geography, (*c*) Geography of Plants and Animals, (*d*) Geography of Man; B, The Geography of selected regions. For Oxford Junior Locals the British Isles, for Seniors the British Empire, and for both another prescribed region; for leaving certificates British Isles and Empire, and for Higher Certificate North America in addition. A, (*a*) and (*b*) are the ordinary subjects treated in text-books of physiography, (*c*) deals with vegetative regions and their animal life—not floras and faunas, and (*d*) contains one section on the races of men, and another on the environmental control of human activities and organizations. In (*c*) and (*d*) we find traces of the geographical spirit, while (*a*) and (*b*) remain at the old South Kensington physiography stage, with land-forms added.

The Cambridge Local regulations recognize geography as a preliminary subject, but not as an independent subject for junior or senior certificates, where it is attached to history, while physiography is a subject here called physical geography. The Higher Local

regulations demand a knowledge of — (*a*) Physical Geography, (*b*) Political and Economic Geography, and (*c*) History of Geography; but one is surprised to find as special subject for 1907 Africa south of the equator. Has the northern part of the Congo basin or of the Victoria Nyanza to be left out of account?

The Oxford Higher Local syllabus is much the most satisfactory, and is at once less rigid and more geographical in its specification of the contents of general geography.

Most other universities issue syllabuses somewhat similar either to those of Oxford or of Cambridge, where they recognize the subject at all. For instance, the Joint Matriculation Board of the Universities of Manchester, Liverpool, Leeds, or Sheffield permits geography or Natural History to be selected as an optional subject. Two papers are set, one on Physical Geography, and one on Political and Commercial Geography.

The University of London is an exception, and the matriculation syllabus published by it is the most satisfactory of any, though the subject receives the cumbrous title of Physical and General Geography instead of Geography.

"The following regions in decreasing detail: (*a*) England and Wales, (*b*) Scotland and Ireland, (*c*) Europe, the Mediterranean, the North Atlantic, North America, and Greenland, (*d*) the remaining Continents. Recapitulation from the point of view of the British Empire.

"Attention should be directed to the following aspects of the several regions: The broad contrasts and chief features of the land relief; the chief features of the coastal outline as related to those of the relief; the disposition of the water-partings and of the chief river-basins; the winds and sea-currents, distribution of rainfall, the climatic contrasts, and the resulting agricultural contrasts; the districts of exceptionally dense or rare population considered in relation to their position, natural resources, and industrial activities; the arrangement of the political divisions upon the land-relief and with reference to the drainage system; the analysis of the positions of the great towns.

"Candidates will be expected to understand the main physical causes of the phenomena they describe, such as variations of atmospheric temperature and pressure, their seasonal and regional distribution; the causes of precipitation, winds—their cause and prevalence in different regions, the interpretation of weather charts, and the meaning of the network and other conventional symbols employed in maps. Time need not be spent in elaborate map-drawing. The answers in the examination should be illustrated, where necessary, by simple diagrams, correct in general proportion, but without detail. Candidates may be expected to identify maps without names, to insert upon

such maps the position of geographical features, and to work problems as to local time."

In connection with the Junior Schools certificate, the University of London has followed the plan of examining on the syllabus submitted by the teacher. This has drawbacks as long as teachers are untrained in geography, and is apt to result in the syllabus specifying the pages of some text-book which has been used. Probably a general syllabus, somewhat on the lines of the matriculation one, but of a more elementary nature, with a knowledge of the World in general and of the British Isles in particular, plus an additional area or aspect of geography selected by the teacher, for which he submitted a syllabus to the university, would ensure an adequate general knowledge while allowing for the special interests of the teacher or the district.

Army Examinations.

The regulations for the army qualifying examination couple geography with English history and divide the subject into—(1) General; (2) British Empire, rather more in detail. General geography consists of the main physical features of the World, the elementary principles of map-construction, and elementary political geography. This is too vague a syllabus to be of much value.

Commencing in November, 1905, no geography at all is required for the competitive examinations!

Though military history and geography is a subject taught at Sandhurst, no geography is required from university candidates for army appointments! nor at Woolwich!

The most eloquent comment is to mention such a state of affairs being in existence in 1906.

On the other hand, military geography of a comprehensive nature is an obligatory subject for the entrance examination to the Staff College, though economic conditions might profitably receive more attention. Military, general, and strategical geography in particular are subjects in the first and second year course at the college, though the subject is not mentioned in the tabular statement of examinations.

The Civil Service Examinations.

During the past year the Civil Service Commissioners have issued syllabuses in geography for several examinations, which have a number of interesting and valuable features. The most striking is, that each begins with "The different regions of the Earth—forest, grass, and desert; hot, cold, and temperate—and the kinds of human activity suited to each." The spirit of this beginning is very different from that exhibited in most geographical text-books and teaching. If the Civil Service Examiners can inspire a scientific and "cultured" attitude in their candidates, they will do more than secure profitable

civil servants; they will greatly improve the quality of a secondary education, which at present is given too much on the Strassburg goose-feeding principle, producing a diseased though highly marketable liver.

The first paragraph is followed by one which may be looked upon as demanding the physical explanation of these phenomena, although this is not explicitly stated. Land-forms and maps follow. After this, the chief physical features of the Earth, position of chief cities and countries, rivers and mountain ranges are to be known, probably as a preliminary to the examination of natural features and physical conditions on the habits and occupations of man and the growth of towns. Finally, two or three natural regions are mentioned for more detailed study. Had the connection between the successive paragraphs of the syllabus been explicitly stated, it would have been a great advantage, though no doubt the intelligent teacher will do this for himself. On the whole, the Civil Service Commissioners will aid the efforts of those who are trying to make geography a profitable educational discipline.

While improving the quality of the geography demanded of candidates for the less important civil service appointments, the Civil Service Commissioners have not yet even recognized it as an optional, much less as a vital, element in the training for the higher appointments where it is indispensable. Our university classes show that this need is being felt, especially in the career of those preparing for colonial appointments. It is to be hoped that this very necessary recognition on the part of the Civil Service Commissioners will not be long delayed. The inclusion of geography in the curriculum of secondary schools, the improvement of syllabuses, and the effective teaching of geography in every English University, except Durham and Sheffield, are sufficient to justify the Commissioners in taking immediate action.

General Remarks.

Syllabuses may be divided into classes. One class demands, under the title of Geography—(*a*) a knowledge of what is otherwise known as nature study, or physiography, the principles being illustrated by selected geographical facts; and (*b*) an analysis of the topography of selected areas, their political divisions and economic conditions. The class at the other extreme insists on the geography of the World in general and of selected areas in particular, in all its relations, with the introduction, where they naturally occur, of such physiographical explanations as are not already understood by the pupil. There are many intermediate forms between this systematic physiography with geographical illustrations and this systematic geography with physiographic explanations.

Obviously a good teacher can profitably utilize either class of syllabus,

both for instructing and for educating his pupils. In nearly all modern syllabuses the old gazetteer geography is more or less definitely eliminated, and cause and effect are explicitly laid down as objects of study. There is little evidence of stupid conservatism and much of real effort to make the subject an educational one. The differences in syllabuses are mainly due to the different conceptions of the scope and discipline of geography held by their framers. The most encouraging feature is that authorities should be dissatisfied with the older syllabuses, and attempt to frame something better.

The two classes of syllabus, however, differ profoundly. They involve different outlooks on the world, and yield a different discipline. The physiographic outlook is that on the *properties* of matter, of energy, and of life. It is not the geographical outlook, which is concerned with the *distribution* of matter and energy and life, and of the associations of these phenomena on the Earth's surface. Geography deals with the World as a whole, and with the natural subdivisions of the World recognized as unities. The mathematician or physicist feels no compunction about selecting half a dozen unnatural political divisions, bounded, it may be, by lines of latitude or longitude as a subject of special geographical study. The biologist would have some qualms about setting, let us say, the upper half of the forearm, the left side of the nose, and the big toe as special subjects, yet when he approaches geography he is willing to treat the World in a similar fashion. The politician naturally studies the Gold Coast Colony, British New Guinea, and even Hong Kong as units, but even he, one would expect, would hardly prescribe their investigation without examining contiguous areas. Yet this is what so many framers of syllabuses do. With the best will in the world, they have grasped only the fact that geography treats of the Earth's surface, but not the more important one that it does not do so as the mathematician, as the physicist, as the biologist, or as the politician treat of it. They make geography a means of teaching a little mathematics, or physics, or biology, or politics. When a schoolmaster complains that his already over-full time-table cannot be choked with this, useful though it be, we feel some sympathy for him. The claim for the recognition of geography is not merely its usefulness; it is because of its value as a discipline not to be obtained from other subjects taught in school.

Because of this, those who have received a geographical training, in addition to a physical, biological, or "humanistic" training, and have come to recognize that there is a geographical point of view as distinct as that given by any one of these disciplines, object to the first class of syllabuses almost as much as the schoolmaster who will have nothing of geography in his school. A syllabus in geography should be so framed as to develop in those following it a geographical perception, as well as information about the salient features of the World. When such

syllabuses prevail and are followed, a new and invaluable instrument will be given to the schoolmaster.

Frankly the question of the position of geography in schools cannot be adequately discussed without a reconsideration of the whole curriculum. The present lopsided courses cannot remain, and something more is wanted to secure a well-balanced education than to patch the existing over-specialized and rather narrow training which they afford.

THE AREAS OF THE OROGRAPHICAL REGIONS OF ENGLAND AND WALES.*

By NORA E. MACMUNN.

THE following table has been compiled from planimetric measurements made at the School of Geography, Oxford, on the orographical map of England and Wales, recently published in the *Geographical Journal* (vol. 24). The limits of the natural regions adopted in making the measurements are shown on the accompanying sketch-map. As a rule, the plains have been measured to the 250-feet contour-line, and the hills have not been considered to begin below that level. Every measurement has been made at least twice, and the mean taken. In many cases four, six, and even eight measurements have been used in determining the mean.

The total area of the planimetric measurement was 58,017·1 square miles. The official figures used in the last census were 58,324·2 square miles. The present tables have been reduced from the original planimetric measurements by applying the correction necessary to reduce the area of the map to that of the official figures.

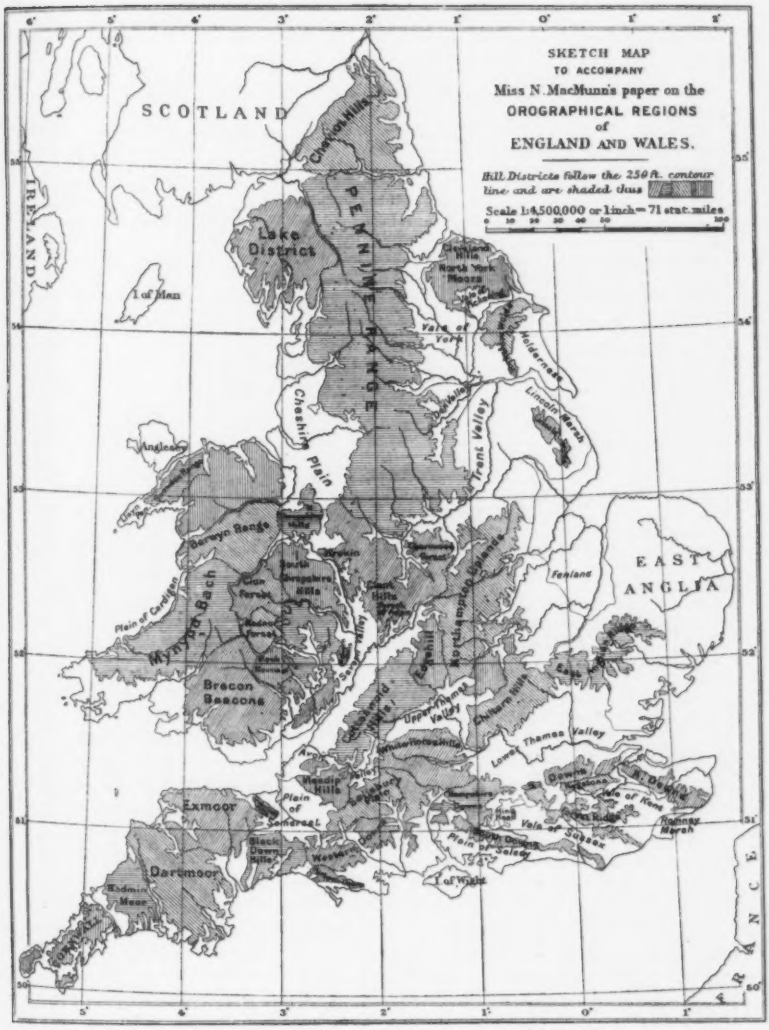
The average height of England and Wales, calculated from these measurements, is 385 feet.

AREA OF OROGRAPHICAL REGIONS OF ENGLAND AND WALES.

Region.	Under 250 feet.	250–500 feet.	500–1000 feet.	1000–2000 feet.	2000–3000 feet.	Over 3000 feet.	Totals.
	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.
Cheviot Hills (south of the English border) ...	—	461·2	637·0	307·7	7·3	—	1413·2
Pennine Chain	—	1609·1	2888·5	1620·0	113·4	—	6231·0
Lake District Mountains †	—	453·2	542·0	311·2	65·8	—	1372·2
West Coast (border to Ribble)	974·3	—	—	—	—	—	974·3
Cheshire Plain	1450·4	22·0	—	—	—	—	1472·4
East Coast (border to Tees)	659·7	—	—	—	—	—	659·7
Tees Valley	289·1	—	—	—	—	—	289·1
Vale of York	1242·8	—	—	—	—	—	1242·8
Vale of Pickering ...	268·0	—	—	—	—	—	268·0
Holderness	519·3	—	—	—	—	—	519·3
Don Valley	397·7	—	—	—	—	—	397·7
North York Moors (with Cleveland Hills) ...	—	323·9	325·9	82·7	—	—	732·5
Yorkshire Wolds	—	205·0	51·2	—	—	—	256·2
Trent Valley (with Lincoln Marsh)	2835·0	29·3	—	—	—	—	2864·3

* Research Department, December 13, 1905. Map, p. 289.

† There is a small area over 3000 feet in Cumberland (Scafell, Helvellyn, and Skiddaw) occupying 0·178 square mile, but which is not shown on the map.


SKETCH MAP
TO ACCOMPANY
Miss N. MacMunn's paper on the
OROGRAPHICAL REGIONS
of
ENGLAND AND WALES.
Hill Districts follow the 250 ft. contour line and are shaded thus
Scale 1:4,500,000 or 1 inch = 71 stat. miles
SCOTLAND
IRELAND
Lake District
I. of Man
PENNINE RANGE
Cheviot Hills
Cleveland Hills
North York Moors
Vale of York
Wolds
Holderness
Lincoln Heath
Lincoln Marsh
Cheshire Plain
Trent Valley
Anglesey
Snowdon
Berwyn Range
Plinlimmon
South Snowdonia Hills
Cambrian Mts.
Plain of Cardigan
Mynydd Bach
Radnor Forest
Brecon Beacons
Black Mts.
Severn Valley
Malvern Hills
Cotswold Hills
Upper Thames Valley
Northampton Uplands
Fenland
EAST ANGLIA
Chiltern Hills
Lower Thames Valley
Downs
North Downs
Vale of Kent
Romney Marsh
Exmoor
Mendip Hills
Plain of Somerset
Salisbury Plain
Vale of Wardour
Vale of Sussex
Plain of Selsey
I. of Wight
Dartmoor
Bodmin Moor
CHANNEL
FRANCE

Region.	Under 250 feet.	250–500 feet.	500–1000 feet.	1000–2000 feet.	2000–3000 feet.	Over 3000 feet.	Totals.
	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.
Lincoln Wolds	—	146·3	7·3	—	—	—	153·6
Fenland	1501·4	—	—	—	—	—	1501·4
East Anglia (Fens to Thames Divide) ...	4266·4	36·6	—	—	—	—	4303·0
Plain east of Fens (Cam to Welland)	1275·3	—	—	—	—	—	1275·3
East Anglian Ridge ...	—	644·5	—	—	—	—	644·5
Triassic Hills (between Pennines and Northampton Uplands)	—	1611·6	231·9	—	—	—	1843·5
Northampton Uplands ...	—	1566·3	78·1	—	—	—	1644·4
Edge Hill	—	265·8	100·1	—	—	—	365·9
Cotteswold Hills	—	564·0	306·3	3·6	—	—	873·9
Jurassic Hills (between Cotteswolds and Chilterns)	—	241·8	3·6	—	—	—	245·4
Chiltern Hills	—	578·5	179·3	—	—	—	757·8
Upper Thames Valley ...	384·3	126·3	1·8	—	—	—	512·4
Lower Thames Valley ...	1615·8	199·8	—	—	—	—	1815·6
White Horse Hills ...	—	520·0	292·9	—	—	—	812·9
Mendip Hills	—	197·5	88·0	—	—	—	285·5
Salisbury Plain	—	465·1	69·5	—	—	—	534·6
Western Downs	—	344·2	109·9	—	—	—	454·1
Hampshire Downs ...	—	341·8	53·8	—	—	—	395·6
Hind Head	—	63·5	20·7	—	—	—	84·2
North Downs	—	168·3	139·1	—	—	—	307·4
Ragstone and Forest Ridges	—	410·1	58·6	—	—	—	468·7
Vale of Kent	708·6	—	—	—	—	—	708·6
Romney Marsh	87·8	—	—	—	—	—	87·8
N.E. Kent (Foreland of North Downs)	358·8	—	—	—	—	—	358·8
Vale of Sussex	646·5	—	—	—	—	—	646·5
South Downs	—	132·5	64·2	—	—	—	196·7
Plain of Selsey (Beachy Head to Itchen-Test divide)	483·2	—	—	—	—	—	483·2
South Coast (Itchen-Char)	974·5	—	—	—	—	—	974·5
Isle of Wight	117·0	22·0	7·3	—	—	—	146·3
Purbeck Downs	—	55·0	14·6	—	—	—	69·6
Blackdown Hills	—	219·7	131·6	—	—	—	351·3
Quantock Hills	—	29·3	17·0	4·9	—	—	51·2
Exmoor	—	385·0	431·2	121·1	—	—	937·3
Dartmoor	—	570·6	418·8	166·8	—	—	1156·2
Bodmin Moor	—	256·2	191·0	14·6	—	—	461·8
Cornwall (south of Fowey and Camel)	380·7	274·5	65·9	—	—	—	721·1
Fowey to Plain of Somerset	792·8	—	—	—	—	—	792·8
Plain of Somerset ...	659·7	—	—	—	—	—	659·7
Avon (Bristol) Valley ...	446·7	36·6	—	—	—	—	483·3
Severn Valley (with Wye and Usk)	1690·7	—	—	—	—	—	1,690·7
South Shropshire Hills ...	—	340·6	260·0	65·8	—	—	666·4
North Shropshire Hills ...	—	305·6	2·0	—	—	—	307·6
Malvern Hills	—	22·0	14·6	—	—	—	36·6
Hereford Hills	—	413·8	120·5	—	—	—	534·3
Monmouth Hills	—	137·4	103·4	1·8	—	—	242·6
Black Mountain	—	19·8	102·5	51·3	29·3	—	202·9
Brecon Beacon (and outliers north and south)	—	265·7	478·2	481·4	20·1	—	1,245·4
Radnor Forest	—	16·0	125·7	80·3	3·7	—	225·7
Clun Forest	—	29·3	215·0	185·1	—	—	429·4
Mynydd Bach Range ...	—	443·1	691·1	395·4	7·3 (Plynlimon)	—	1,536·9

Region.	Under 250 feet.	250–500 feet.	500–1000 feet.	1000–2000 feet.	2000–3000 feet.	Over 3000 feet.	Totals.
	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.	Square miles.
Berwyn Range	—	150·0	347·5	388·6	22·0	—	908·1
Snowdon Range	—	102·5	82·3	79·7	22·0	3·6	290·1
Mountains between Snowdon and Berwyn Ranges	—	216·0	404·2	336·3	9·1	—	965·6
Lleyn Penin	182·8	16·2	2·0	—	—	—	201·0
North Wales coastal plain	182·9	—	—	—	—	—	182·9
Plain of Cardigan ...	124·5	3·6	—	—	—	—	128·1
South Wales coastal plain (border to St. David's Head)	805·9	263·6	40·2	—	—	—	1,109·7
Anglesey and Holy Island	159·0	42·2	—	—	—	—	201·2
Totals	26,481·6	16,364·5	10,476·3	4,698·3	300·0	3·6	58,324·3
Percentages ...	45·4	28·0	18	8	0·5		

REVIEWS.

EUROPE.

Sicily.

'Die Insel Sicilien.' By G. Wermert. Berlin: Reimer (Vohsen). 1905.

These exhaustive statistical treatises on portions of foreign territory are a speciality of German scientific literature. They stand midway between a Foreign Office special report and the typical British work of travel. We have indeed nothing that quite corresponds to them; for even such books as Lord Curzon's 'Persia' or Sir Harry Johnston's 'Uganda' admit a leaven of narrative. The fact is that we have not got the German public with its amazing appetite for, and power of digesting, solid matter. If such a book as Dr. Wermert's 'Sicilien' could be produced in this country, it would be merely as a necessary book of reference, elaborately broken up into sections and subsections, full of tables and lists, and supplied with minute registers of contents, subject headings to chapters, and copious classified indices. No one would dream of reading it consecutively, but all who had to do with Sicily would use it as a lexicon. The German book, however, comes out, written in long continuous chapters, like any other form of narrative, without paragraph marks, subsectional titles, page subject-headings, or any other help by the way to the searcher. The table of contents is a mere list of main chapter titles, and the two indices of names and subjects, appended to a closely written volume of about 250,000 words, contain scarcely 1000 headings, of which very few have more than one reference. The only possible inference is that there is a public in Germany which is expected to read a book of this kind from cover to cover, and needs no such help in its grim task as is demanded by the less seriously minded Briton.

On the other hand, this book is not quite sufficient for the small body of Sicilian specialists; for it gives hardly any references, except to general works. Its manner of treatment is very like that of an encyclopædia, intended to give as much information as any ordinary inquirer could possibly desire, but not to satisfy the extraordinary student. Dr. Wermert has verified his facts by patient study on the spot, and they may be accepted without reserve; but they are not all

the facts. For instance, his long chapter on Historical Development is a mere sketch, very defective in regard to the period before written records. In a volume which professes to treat of the island in its economic, agricultural, and social relations only, this chapter might just as well have been omitted altogether.

If other volumes are to follow dealing with the other Italian provinces, the whole will make a valuable dictionary of Italian Social Order, somewhat in the style of, but much more reliable than, Cuinet's 'Turquie d'Asie.' But, whatever is expected of the German public, that of the rest of Europe will certainly consult these volumes only as works of reference; and we hope they will be better designed and arranged to that end than the present volume. The latter, however, whether or no, will be quite indispensable to the student of the actual state of Sicily.

ASIA.

Some Indian Borderlands.

'Report of Archæological Survey Work in the North-West Frontier Province and Baluchistan.' By M. A. Stein, PH.D. Peshawar: Government Press. 1905. *Plans and Illustrations.*

Our old geographical friend, Dr. Stein, has been doing useful work again as archæologist in India by systematic examination of ancient sites and traditional remains on the North-West Frontier. From Nushki and Kharan, through Loralai and Thal Cotiali, to the Bannu and Kohat districts he has apparently left nothing unvisited which might by any chance contribute to the interest of Indian archæology. So far, whilst there is much in his report which is calculated to throw new light on the historical aspects of many localities which have never been systematically examined before, and one or two old frontier traditions have been displaced, there is nothing much which would attract great attention from the general public outside India. Dr. Stein supports General Cunningham's identification of Heuen Tsangs Fa-la-na (Sanskrit Varna, or Barna) with the Bannu district, and has something new to say about the ruins of Kafir Kot near the junction of the Kurram river with the Indus; but it is further north, on the banks of the Indus, ere yet that river has debouched into the flat Punjab plains, that the interest of this particular report is centred, for it deals with the thrilling story of Aornos, and the identification of that historic rock with Mahaban.

This theory was first advanced by the late Colonel Abbot, and the identification was based on the general appearance of Mahaban and its surroundings, from a distance, together with a curious resemblance between local names and the old Greek traditions. One theory after another had previously been abandoned, until it seemed as if that of Mahaban was the only possible solution of the much-vexed question (in spite of certain radical discrepancies between Mahaban topography and Arian's description of the Aornos rock, which might have been detected even at a distance), and local antiquarians finally pinned their faith to it, *faut de mieux*. And now Dr. Stein has ruthlessly destroyed our tentative convictions, and set the argument rolling again. Hitherto no European has been able to reach Mahaban and return to tell the tale—the Gadun tribe has taken care of that—and it was not without some risk that the venture was finally made by Dr. Stein, under the auspices of the local political officers, Colonel Deane and Mr. Pipon. The result of the local examination of existing ruins and the survey of the cite is conclusive. The maps and diagrams in the report are alone sufficient to prove that there can be nothing in common between Mahaban and the rock described by Arrian. "Of the plateau on the top of Mahaban, which the assumed identity of the mountain with Alexander's Aronos made me (like others) look out for, in accordance with the plain

indications of the classical historians, there was no trace to be seen anywhere." The highest point of the Mahaban ridge is occupied by a pentagonal fort, called Shah Kot, in which Dr. Stein and his Gadun escort spent a wet and miserable night. From this summit next morning he obtained a magnificent view of the surrounding hills, but nowhere could he detect any resemblance to the traditional topography of Aornos. It is, indeed, impossible, after studying Dr. Stein's diagrams and the account of his remarkable expedition, to accept Mahaban any further as the representative of Aornos; and it is disappointing that, with the disappearance of the Mahaban theory, no other suggestion is forthcoming which might lead to identification. There is, indeed, a very plain doubt expressed as to the "truly historical character of this, and perhaps other, episodes of Alexander's campaign." Such a suggestion is difficult at first to accept in face of the remarkable way in which the general truth of Arrian's history has been confirmed by surveyors who have identified his route and the localities mentioned in detail, from Northern India to Karachi, and thence through Makran to Persia. What are the other episodes to which Dr. Stein refers? Possibly the story of Nysa and the Nyseans may still be held as unconfirmed. In that case, we may hope that the determined energy and courage which has led Dr. Stein to the summit of Mahaban may eventually guide his footsteps to the slopes of the Koh-i-Mor.

After disposing of Mahaban, however, Dr. Stein rendered valuable service to archæology by identifying the site of "Buddha's body offering" (the holy spot where he offered his body to feed a starving tigress), which has ever been one of the most sacred of Buddhist bournes of pilgrimage. Applying locally the same critical process of topographical analysis, and his own exceptional store of legendary knowledge and oriental scholarship, to his observations, Dr. Stein has no hesitation in assigning the site of that ancient gathering-place of the faithful to the hill of Banj, also within the territory of the Gadunș, south of Mahaban. Here he found suggestive ruins which coincided closely with the detailed description of the sacred "temple of the collected bones" and its surroundings, as given by the Chinese travellers Song Yun and Heuen Tsang. Even the red-stained earth and the aggressive thorny vegetation were there. Nothing indeed appears to be wanting in order to marshal the evidence in support of the theory to a positive conclusion. It is at least satisfactory to claim this constructive theory as something of a set-off against the lamentably destructive evidence which has again launched Aornos into the regions of speculation. The value of these most recent additions to our antiquarian knowledge of Northern India will be recognized by all travellers in those regions, and by all scholars all over the world; and it is much to be hoped that the "Account of the Ancient Geography of Northern India" with which Dr. Stein has been entrusted for the 'Encyclopædia of Indo-Aryan Research,' will have a far wider circulation than is usually accorded to reports written for the Indian Government similar in character to the one under review.

But why should Dr. Stein limit himself to Northern India? There is already a considerable store of information to be culled from past political and survey reports relating to the mediæval geography of Eastern Persia, Makran, and Southern Baluchistan, extending to North-Western Afghanistan and the Oxus, including much that is of the deepest interest in connection with the Arab occupation of the Indus valley. All this still awaits the scholar and antiquarian to collate and co-ordinate, piecing together the scattered patchwork into a connected whole in illustration of one of the most fascinating periods of the commercial history of the East. Even Las Bela has its interest for the Buddhist scholar. One point only may be noted here for the benefit of any future compiler of such a work. Dr. Stein appears to me to attach too much importance to the measure of a

distance indicated by a "day's march" in the records of Chinese and Arab geographers. A day's march was just as much or as little to them as would usually take the traveller from one resting-place to the next. It extends (when the march was a day's march for a riding-camel) to 80 miles, or where one desirable resting-place is fairly close to the next, it may diminish to 10 miles.

We wish Dr. Stein all success in his next venture, which will carry him far beyond India.

T. H. Holdich.

Celebes.

'Reisen in Celebes ausgeführt in den Jahren 1893–1896 und 1902–1903.' Von Paul und Fritz Sarasin. 2 vols. Wiesbaden: 1905. *Price* 21*s*.

Readers of the *Journal* need no introduction to this indefatigable and inseparable pair of explorers, whose wanderings it has followed step by step for nearly two decades, especially as concerned with Celebes, most attractive because least known of all the lands explored by them. From the dates given in the title of this work, it will be seen that an interval of six years lay between their two successive visits to the great Malayan island, from the map of which they have removed so many blank spaces. Here, as elsewhere, their programme was ambitious (I do not use the term in an invidious sense), embracing the various departments of geology, botany, zoology, and ethnology, all of which afforded ample scope for the display of their great experience and greater zeal for the advancement of the natural sciences. As their rich collections, and numerous excursions in every part of the fantastically-shaped island, have already been described (see especially vols. **20**, p. 229; **21**, p. 454; and **22**, p. 458 of the *Journal*), it may here suffice to give the broad conclusions that Drs. Sarasin have arrived at regarding the fascinating problems connected with the geological evolution of Celebes, and the history of its very peculiar flora and fauna.

Despite the views held by Wallace and some other distinguished observers, Celebes is to be regarded as of relatively recent origin. As shown by the extensive limestone strata, it was covered in early Tertiary times by a shallow coral sea, above which the mountain ranges did not begin to rise till about the Miocene age. The sands and marls of this age, the "Celebes Molasse," as they are here named, are largely developed, and their contents, partly brackish water deposits, partly coal, point to the existence of dry land which may at that time have already been occupied by Asiatic species. In all the animal groups there are members of early types which must belong to this first invasion, and are now represented, for instance, by the babirusa and by the molluscs of Lake Posso. The continuous upheaval of Celebes and surrounding islands during Miocene and Pliocene times brought about extensive land connections, as must be inferred from the character of the present insular fauna. Thus North Celebes was joined through Sangi with the Philippines (Mindanao), South Celebes with East Java, Flores, and the other lesser Sunda islands, and East Celebes through the Moluccas with New Guinea and Australia. Along all these routes migratory movements took place both to and from Celebes. Thus Javanese species passed through Celebes and the Moluccas eastwards, Philippine animals through Celebes southwards to Flores, and Australian and New Guinea forms to Celebes and thence northwards to the Philippines, while many wanderers stopped in Celebes without travelling further. In course of time several of the last-mentioned developed new species, and even new genera, whose origin can be inferred only from the spread of the nearest related forms. Others, again, have remained unmodified as living witnesses to former land connections. Of special importance for the reconstruction of these vanished land routes are

those *species* which Celebes *exclusively* possesses in common with one or other of the above-described regions, without ranging further over the archipelago. Such species can have reached Celebes only by a direct route joining it with some particular land, since no other way was available for their spread. Celebes possesses representatives of such exclusive species, which are elsewhere found either in Java alone or in the Lesser Sunda group, or in the Philippines, or in the Moluccas alone. Totally different are the relations with Borneo. Although the two islands have many animal forms in common, these are also found either in Java or the Philippines, whence they may have reached Celebes. There are no species which are exclusively peculiar to Borneo and Celebes, and from which a direct land-route between the two islands might be necessarily inferred. No mammals, birds, reptiles, crabs, snails, chinches, or ants are limited to both islands; hence the Asiatic-Sundanese forms found in Celebes did not come directly from Borneo, but from Java to South Celebes, or else from Borneo round by the Philippines to North Celebes. Thus the narrow Macassar strait flowing between Borneo and Celebes is seen to be of great importance as a biological divide, and this so far corresponds with the Wallace parting-line which is also drawn through the same strait. But in other respects the views of these eminent naturalists are widely divergent, since Wallace regards Celebes as a land of "remote antiquity," while the Sarasins treat it as of "relatively recent" origin.

Ethnologists will be glad to find here a very full account of the primitive Toála cave-dwellers of south-west Celebes, about whom so many vague reports have for some time been in circulation. They were twice visited by our travellers, who regard them as the true aborigines quite distinct from the present Malayan populations, and perhaps forming a connecting link between the Veddas of Ceylon and the Australians. They may have reached Celebes before the subsidence of the former land-connections, at a time when early man was migrating all over the Australasian lands.

These well-printed volumes are richly equipped with a copious index, 1 general and 10 sectional maps, 12 coloured plates, and 240 inset illustrations.

A. H. Keane.

AFRICA.

Northern Somaliland.

'With the Abyssinians in Somaliland.' By Major J. Willes Jennings, D.S.O., R.A.M.C., and Christopher Addison, M.D., F.R.C.S. London: Hodder & Stoughton. 1905.

This interesting book describes a journey from Gumburra made with the Abyssinian Expedition into Somaliland ("a land of thorn trees, of desert, and of prairie") under Colonel Rochfort. This force acted under orders from General Egerton, and its object was to check the Mullah in his wanderings, and by its occupation of Wardair and Gorabai to close against him an important line of retreat. The book contains graphic descriptions of the operations in the field, the difficulties of preparing such an expedition, incidents of the march, and the annoying and unavoidable delays experienced through scarcity of water. The author and Lieut. Ogilvy headed an expedition to locate the scene of Colonel Plunkett's disaster at Gumburra. "No memorial marks the spot in honour of the brave soldiers who fell there, yet they, like many more who die for Britain, have a tomb in the hearts of their comrades, and a memory in the memory of their deeds that is more enduring than stone."

The duties of a medical officer do not appear to have been very severe during the expedition, and Major Jennings spent a good deal of his time satisfying his sporting instincts. That all the officers were keen sportsmen is evident by the

many references throughout the book to the game and birds of the country. The author describes at length the conditions of military service in Abyssinia, the soldiers' dress and equipment, the troops and their mode of fighting, and the folk-lore, industries, religion, characteristics, and customs of the Abyssinians. The Somalis do not come in for much praise, and are described by the author as "a few good, the majority poor to medium, many absolute wasters, and as liars unsurpassed." They have an intense hatred of the Abyssinians, who in turn despise them, and consequently there were continual squabbles between the two races, both in camps and on the march. At the approach of the rainy season, the expedition was ordered back to Berbera, and no time was lost in starting, the return journey being enlivened by big-game shooting.

The book is well and attractively written, the information it contains good, and the matter is beautifully illustrated by nearly seventy fine photo-blocks of more than average interest.

AMERICA.

The La Plata Region in the Eighteenth Century.

'Geografía Física y Esférica de las Provincias del Paraguay y Misiones Guaraníes compuesta por don Felix de Azara, Capitán de Navío de la Real Armada, en la Asunción del Paraguay, 1790.' Royal 8vo, pp. cxxxii. and 478. *With Maps.* Montevideo: Museo Nacional. 1905.

The *Museo Nacional de Montevideo* has recently published an interesting and valuable manuscript existing in the Biblioteca Nacional of Uruguay. It is ably edited and annotated by Señor Rodolfo R. Schuller, who has enriched the volume with voluminous historical, biographical, and bibliographical data, and a comprehensive ethnological essay on the primitive races of Uruguay and the adjoining territory.

It will be remembered that Azara was sent to South America in 1781 as a Spanish commissioner, to determine the limits of the Spanish and Portuguese conquests under the much-vexed and extremely vague Treaty of San Ildefonso. He was an engineer officer of considerable scientific ability. Disgusted with the interminable delays and tergiversations of both nations, he conceived the bold idea to map, at his own expense, extensive areas of the territories indicated in the title to his work above named. He employed thirteen years in his self-imposed task, and, ably seconded by his subordinate officers, explored a vast extent of country traversed by immense rivers and covered by forests and lake districts, and peopled by Indian tribes. Much of the result of his labours was given to the world in the first years of the past century, and no one, in studying the political and natural history, ethnology, and geography of the Plata valley, can afford to neglect the writings of Azara.

The work now before us describes eleven principal voyages of exploration, which include the southern half of Paraguay, the whole of Corrientes and Misiones, north-west Uruguay, the middle sections of the Parana and Uruguay rivers, the lower Paraguay, and an attempt to ascend the Rio Pilcomayo. All of these voyages deal largely with the missions from which the Jesuit fathers were driven some years previously by order of the king of Spain. The latitude and longitude of numerous points were obtained, and served for the mapping of the districts with considerable accuracy.

The first part of Azara's work treats almost entirely of geography, and the data upon which he bases his maps. The second part is a "General Description" of the areas explored. Despite the high repute in which Azara's works are held, they

give frequent evidence of lack of sound judgment and accuracy of observation. For instance, he says, "We may take as dreams what they tell us in Europe about the fertility of these countries. I have gone over the prairies of Buenos Ayres and Montevideo, I have reflected, informed myself, and fully concluded that if these countries could be suddenly populated the same as those of Europe, all the people would die of hunger by the end of ten years, for the lands would not produce *even one for one*." Either Azara was an unintelligent observer, or he was influenced by the desire of Spain to retard the progress of the Plata valley in the interest of Perú, Panamá, and Cartagena.

He closes his work with interesting and extensive, although frequently doubtful, ethnological data regarding the Charruá, Mbayá, Payaguá, and other tribes, which in early colonial times were the most warlike, brave, and indomitable of any of the Plata valley.

In the archives of Uruguay and the Argentine Republic, there are, no doubt, many extremely valuable manuscripts relating to the history, geography, and ethnology of southern South America. It does great credit to the able and devoted scholars of both of those rising states that they fully comprehend their value, as well as the interest with which the world welcomes their publication.

G. E. Church.

THE MONTHLY RECORD.

EUROPE.

Botanical Geography in Ireland.—The *Scottish Geographical Magazine* has published four vegetation maps of parts of Scotland, whilst the *Geographical Journal* has published the same number of vegetation maps of the Pennines; and it is with great pleasure that one notices that this important work has now secured recognition in Ireland.* The authors, admittedly, were at the outset sceptical as to the value of the work in Britain; and the subsequent adhesion to the movement initiated by the late Mr. Robert Smith of so pronounced a floristic botanist as Mr. Lloyd Praeger is an event in the history of botanical geography. The authors describe and map fourteen vegetation types. Most of these have been found in the districts previously dealt with by the method of botanical survey, but at least two new types are described. These are, a "Racomitrium moor," where a species of moss (*Racomitrium lanuginosum*) shares with the common heather (*Calluna vulgaris*) a claim for dominance; and a "Scirpus moor," where the deer's-hair sedge (*Scirpus cæspitosus*) is occasionally dominant, but oftener shares dominance with the heather. The Eriophorum or cotton-grass moor, is not nearly so extensive in South Dublin as on the Pennines, the Dublin hills being very largely covered with heather moor. In the districts previously surveyed, the lower slopes of the hills have been found to be covered by heath pasture: such situations are marked on the present map as dominated by bracken or gorse. A study of the lists of the plants found in these bracken and gorse associations, however, seems to show that the difference is more apparent than real, and is due, to some extent, to subjective interpretation. Woods are quite rare; and the authors have not found it possible to subdivide the cultivated land into a wheat and a no-wheat region, as has been done on the previous vegetation maps of Britain.

* 'The Vegetation of the District lying South of Dublin.' By George H. Pethybridge and Robert Lloyd Praeger (*Proc. Roy. Irish Acad.*, vol. 25, Section B, No. 6, pp. 124-180, with map and plates).

The authors "decided at the very beginning to avoid reading up the detailed work done in Scotland and England;" and it is possibly due to this truly Hibernian resolution that the authors have failed to understand (see p. 141) the method of compiling the lists of the plant-associations given in the Scottish and English papers. It is greatly to be regretted that the authors have published their map with a brand-new colour scale, making the fourth colour scale for the nine vegetation maps already published! Doubtless each author thinks his own scale the best, but the result is aggravating to students. The paper is written with characteristic Celtic vigour, and the photographic illustrations are excellent. The map is on the scale of 1 inch to the mile, covers about 180 square miles, and is printed by the Ordnance Survey Department.

The Seine-Inférieure.—An article by M. V. Turquan, in the Report of the twenty-fourth session of the Congress of French Geographical Societies (Rouen, 1904), takes stock of the Seine-Inférieure from an agricultural, industrial, commercial, and economic point of view. The article is replete with information, but is not less serviceable to geography for the lesson it conveys of the interdependence of these four branches of the subject, and of the causal dependence of all four on the human geography of the region. A brief account is first given of the general geography of the department, more particularly the economic character of its soil (which may be divided broadly into the pasture land of Bray and the arable land of Caux), and its comparative areas of arable, forest, pasture, and orchard. Well watered by rain and river, and blessed with a mild, moist climate, the land is agriculturally one of the richest departments of France. Its arable land constituted, at the last census, 62·7 per cent. of the whole surface. This is laid out in cereals, potatoes, beetroot, pulse, vegetables, hemp, flax, colza, etc. Forest now occupies 11·7 per cent. of the whole surface, and within the last century has extended its area by 22,000 hectares, due to the conversion of mediocre soil into woodland. Account is taken of the live stock. During the last forty years there has been a decrease in the number of horses, and the flocks of sheep have shrunk to half their strength. There is a large industry in milk, amounting to the yearly value of fully $1\frac{1}{3}$ million pounds, carried on principally in the Neufchâtel arrondissement, but the butter and cheese of the Gournay district are also in universal esteem. Poultry and bees are also largely kept. The paper treats of the subdivision of the agricultural population into working proprietors, farmers, métayers, etc.; the sizes of the holdings, prices of land, farm-rents, etc. The farms of the Caux region are mostly 60 to 80 hectares in size. The use of agricultural machinery is widespread, and each arrondissement has its agricultural societies. There is also a departmental Chair of Agriculture, a practical school at Aumale, and an agronomic station at Rouen. Lastly, for purposes of comparison, a general view is given of farming industries in the whole of France.

Scientific Study of the Lagoon of Venice.—We are informed by the 'Reale Istituto Veneto di Scienze Lettere ed Arti' that it has been decided to undertake a systematic study of the geophysical phenomena which, directly or indirectly, concern the lagoon of Venice. A special committee has been appointed for the purpose, and preliminary investigations on the subject of the tidal waves of the upper Adriatic, and the rivers flowing into it and the lagoon of Venice, have been set on foot. They have been placed in charge of Dr. G. P. Magrini, who will be assisted by Profs. L. de Marchi and T. Gnesotto of the University of Padua. Valuable and interesting results may be anticipated from these researches.

The Northern Urals.—Profs. Duparc and Pearce, whose researches have added so much to our knowledge of the physical geography of the Ural range, describe, in the December number of *La Géographie*, the remarkable series of

terraces which they have brought to light on the slopes of the northern part of the range. This is composed of several parallel ridges running for long distances almost due north and south, the most important, which form the European-Asiatic water-parting, being the Poyassovoi Kamen, composed entirely of quartzites, which also appear to be the main constituents of the secondary chains, such as the Liampovsky Kamen and the Kvarkush. All these ranges display the terrace-formation (some hints of which had previously been noted by the authors in the more central parts of the Urals) in its most characteristic form. The crests form plateaus which extend longitudinally with the greatest regularity, while the more elevated summits rise here and there in the form of truncated cones or a succession of level steps. Minor terraces are to be traced on the slopes of the ridges and summits, and an accordance of level may often be noticed over great distances. The phenomenon is so general that there can be no doubt that it represents the vestige of a former topography, the age of which it is difficult to determine, though it may be confidently stated that it was older than the existing quarternary valleys, with which the terraces bear no direct relation. The fact that the terraces become more and more marked in the northern parts of the range may be ascribed to the greater development, in this direction, of the quartzites above alluded to; for these rocks, being more refractory than most to atmospheric denudation, have no doubt preserved the old relief to a greater extent than the other formations represented in the range.

ASIA.

Agriculture in Cyprus.—A report by Prof. Wyndham Dunstan on the agricultural resources of Cyprus, especially its cotton cultivation, was issued as a Parliamentary paper in September, 1905. A glance at its past history shows the contrast between the 7–15,000,000 lbs. of cotton the island produced under Venetian, and the 1,000,000 lbs. under British, occupation. On a rough calculation, only 4000 acres at most are now under cotton cultivation against 60,000 acres in Venetian times for export, and another 60,000 for local manufacture. Two kinds of cotton are produced—"dry" cotton (grown without watering), and "wet" cotton (grown on irrigated land), of better quality and higher price. The average yield is far higher in Cyprus than in America, often reaching that of Egypt. Most is exported, but an appreciable quantity is woven into native cloth. The climate and soil are particularly well adapted for cotton-growing, while the Cypriot is a born agriculturalist, and specially a cotton-grower. Native labour is readily obtainable, and outside labour, if wanted, is to be had from the neighbouring coasts. The chief climatic drawback is want of rain, particularly in the initial stages of growth, necessitating resort to artificial watering. For the extension of cotton cultivation and its export to this country, the main needs are—(1) an effective system of irrigation; (2) an agricultural department qualified and equipped to conduct systematic experiments with a view to improvement of cotton culture, and supply of information and advice to native cultivators; (3) shipping facilities, and especially a direct service to England with low freight rates. In the matter of irrigation the Government has in recent years spent £60,000 in irrigation works, with results hitherto disappointing. Prof. Dunstan sees no reason why the "shadoof," so successful in Egypt, should not be tried in Cyprus. Artesian wells might, in his opinion, go a long way to solve the water problem in Mesaoria. He points how, in Venetian times, the needed supply of water was drawn chiefly from wells sunk by the natives. In view, too, of the treeless state of a large area, the judicious planting of trees should be vigorously prosecuted. As to the second want, Prof. Dunstan gives in a separate memorandum (No. 2) his detailed scheme for the organization of an Agricultural Department. Its labours would include investigation into the

composition of the soils of Cyprus, and the use of artificial manures; cultivation of cereal, root, and fodder crops; cotton, fruit, and vegetables; grapes and olives and aromatic oil plants; liquorice, tobacco, etc. The question of these various cultures is treated in a summary manner.

Settlements in Ancient Palestine.—With the support of the Imperial Academy of Sciences, the Ministry of Instruction, and private assistance, Dr. Ernst Sellin, Professor of Old-Testament Exegesis and Biblical Archæology in the Evangelical Theological Faculty in Vienna, conducted excavations in northern Palestine in 1902, 1903, and 1904. The rich results obtained are not without geographical interest. Taught by the experience of the English and German explorations, the Austrian investigator at once, from the beginning, applied his energies to one of those wide plains distant from Jerusalem where his predecessors had first struck on important finds. Here lie heaped the mounds constituting a typical feature of the historic landscape of the Near East—the so-called "tells." In them (as in the excavation of ancient Ilium) are found the ruins of towns piled successively one on the other throughout a period of thousands of years. Dr. Sellin selected the Tell Ta'annagh, one of the largest mounds, as much as 1115 feet long by 525 feet wide, and 130 to 160 feet high, situated in the great battle-plain of the land, the plain of Megiddo. It lies south-east of Haifa, on the south side of the railway line. Through this plain the caravan-route from Babylon to Egypt ran from the earliest times. The present name of the tell commemorates the ancient name of the town of Ta'annach, a town mentioned in Egyptian inscriptions of 1500 B.C. figuring in the Bible as the seat of a Canaanite king, and afterwards as having been taken in possession by the Israelites. The name vanishes at a comparatively early time out of literature. Dr. Sellin's excavations have established the fact that on the hill of Ta'annach there stood until crusading times an Arabian town with castle. In the hundred to two hundred years of its existence, it developed quite a considerable culture. Destroyed by the Crusaders, the place has since lain a neglected ruin. In an earlier period, in the time of the Romans, there was no settlement on the hill itself, but a place at the foot of the hill then bore the ancient name. The Romans were wont to utilize hills as sites for citadels, and to turn the plains to account as settlements. Fortification of the place was, however, superfluous, seeing that one hour to the west there lay the strongly fortified Legio, and four hours to the east arose Scythopolis—strongholds sufficient for protection of the plains. Nor in the Greek age, about 400 B.C., was the hill itself occupied. On the contrary, the town itself must have been totally destroyed when Greek influence began to assert itself. Provisionally, the time for that event can be taken only as between 722 and 500 B.C. This old town was founded, about 2000 B.C., by the Canaanites (Amorites), known as a people of culture, who, between 2500 and 2000 B.C., took possession of all Palestine. Between 2000 and 1600, the town received some cultural influences from Babylon and Egypt, and after this, absorbing Phœnician and Ægæan elements of culture, it made a remarkable advance. This advance came to a sudden end when, under Thutmosis, or about 1500 B.C., the Egyptians plundered the town with its west citadel built in this flourishing Canaanite period. Till 1300 the town stood under Egyptian supremacy; clay houses marking this period of culture. Down to 1000 Israelitish influence gradually penetrated. The possession of the land by the Israelites is denoted by no sharply defined section in its culture. There was rather a process of assimilation lasting several centuries. Not till 1000 begins the classic Israelitish period. Solomon is, indeed, to be taken as the builder of the east citadel with the east fort. A town then needed strongholds outside its pale proper. After the partition (about 950 B.C.) of the Israelitish kingdom, the cultural centre of gravity lay, not in the old Judaic

kingdom, but in the northern kingdom of Israel, the so-called Kingdom of the Ten Tribes, to which belonged the towns of Megiddo, Ta'annach, etc. After this, down to 800, the Babylonian influence seems to have entirely vanished, there remaining the Canaanite-Phœnician, the Egyptian, and especially the Cypriot influence. Then begins the period of the gradually penetrating Greek culture. The town had attained its maximum extension; then came its destruction, perhaps at the hands of the Egyptians, perhaps of the Scythians. Thereupon, in the course of 1500 years, storm and rain deposited over all the ruins a layer of earth 7 to 13 feet thick, on which the Arabians were free to build their town.

Region of the Poyang Lake, Central China.—An instructive report on a recent voyage on the Poyang lake and its main feeder the Kan, carried out by Mr. Consul Clennell on board a British gunboat, was issued as a Parliamentary paper in December last. The region in question is, of course, fairly well known to Europeans, but none the less will Mr. Clennell's descriptions serve in many ways to correct erroneous ideas, while his account of the hydrographical system of the Poyang lake and the nature of the surrounding region is perhaps the clearest that has yet been given. The voyage was the outcome of negotiations with the Chinese authorities, with a view to establishing the right of foreign war-ships to navigate the Poyang lake, and the first part of the voyage was made by H.M.S. *Astræa*, accompanied by the gunboats *Kinsha*, *Teal*, and *Snipe*. Everywhere the reception seems to have been quite cordial, no indication being observable that the visit was in any way unwelcome. The Poyang lake consists of two sections of very different character, the shores being abrupt towards the north, while further south the lake spreads with no fixed limits over a wide level plain. Mr. Clennell points out that in the northern section there are deep bays masked (especially on the east) by intervening headlands, so that their extent has not, perhaps, been realized by previous visitors. To the west the land rises in the Lushan group of mountains to heights of 4000 and 5000 feet. The Lushan seems to be almost entirely volcanic, and, like the Hsishan further south, to have no immediate relation to the general geology of the neighbouring country, which consists, where not an alluvial or sandy plain, of red sandstone with no sharp relief. Both the mountain groups above mentioned give place westward to lower ground, while south of the barrier which separates the basin of the Poyang from the Yangtse, the country is for a long way of very slight elevation. The mapping of the lake is almost an impossibility, owing to the great and sudden changes of water-level and the enormous areas of level ground thus inundated. The currents also cannot be depended upon, as their direction may be entirely altered as the result of local rainfall. The town of Wuchŭng occupies a favourable position on an island or peninsula between the mouths of the Kan and Hsiu rivers, and is described as a prosperous commercial town of probably six times the population of Nankang, which, though but a ruinous village, is marked in most maps in large capitals. On the upper Hsiu river is Wu Ning, an important centre of tea cultivation, while the chief commercial centre of the lower basin is Tu Chia Pu. The published maps of this region are said to be all incorrect. The Kan river was ascended 60 miles beyond Nanchang, which is not only the largest city in Kiangsi, but, from a Chinese standard, a very fine town. It is incorrect to describe it as on the southern shore of the Poyang lake, as many miles of delta intervene. The country is intersected by innumerable channels, and existing maps are very incorrect. The main stream of the Kan appears to be navigable, under favourable conditions, for a great distance, though long delays might have to be encountered. A British steamer and two launches have lately begun to ply between Kiukiang on the Yangtse and the mouth of the Kan. Opposite Chang-shu, which formed the turning-point, the

Yuan-chou river enters, draining a rich mineral region, but not available for steam traffic. The latter part of the report, in regard to which limits of space forbid us to enter into details, describes Mr. Clennell's junk voyage across the eastern basin of the lake to Jao-chou, and an overland journey to the important porcelain works of Chingte Chün. This town, which during the busy season has a population of about 400,000, recalled the poorer parts of Manchester rather than anything Chinese.

Dr. Tafel's Geological Researches in Northern China.—The journey to which reference was made in the December number led from south to north along the whole meridional section of the Hwang-ho's course between the provinces of Shensi and Shansi. The region has rarely been visited by scientific travellers, and Dr. Tafel's observations will shed much new light on the physical history of the region.* While ascending the valley of the Hwang-ho (which he did by land throughout), Dr. Tafel was able to make a careful study of the escarpment of the Ordos-Shensi tableland, which runs from north-east to south-west and west, and falls abruptly into the trough of the valleys of the Wei-ho and Fwen-ho. The tableland is composed of upper Carboniferous sandstone, covered by the red clays of the so-called Gobi formation, and its escarpment is masked to some extent by the deposits of loess through which the Hwang-ho flows. It is pierced at Lung-moen by that river, the valley of which is of much more recent date than the trough above alluded to, into which it descends from its higher level. Between Tung-kwan (at the great elbow of the Hwang-ho) and the gorge by which it pierces the escarpment the river is wide and shallow, and though ferries exist in this section, the passage of the river by them is a tedious process, often occupying one and a half to two days. Hence the importance of the route across the river at Tung-kwan. At the gorge the river narrows to some 40 yards, and it seems incredible to the traveller approaching it that such a stream can possibly make its exit from the mountain wall confronting him. The saying that the great Emperor Yu cut a way for the stream with his sword gives an apt notion of the nature of the passage. A little north of Lung-moen Dr. Tafel discovered a mass of granite, of recent date, of which there had been no trace further south, while at Hu-kou, where the river crosses a harder bed of the Carboniferous sandstone, it forms a distinct fall, the existence of which does not seem to have been known to geographers. The water drops some 30 feet into a narrow fissure only 70 yards wide, the depth of which, according to native ideas, is unfathomable. Between Lung-moen and Hu-kou the river freezes (though this is not the case either above or below this section) and forms a natural bridge, of which use is made especially for the transport of coal, which is mined at various points on the Shensi-Ordos escarpment. North of Hu-kou the traces of wind-erosion became very manifest, and the loess deposits were sensibly smaller. About here a few isolated summits were seen rising above the uninteresting expanse of the sandstone, and a neighbouring part of Shensi has been deeply eroded by streams. On reaching Wu-bau-hsien, the rainless conditions prevailing further south ceased, and imposing villages were seen. Wu-bau is noted as supplying a large proportion of the boats used on the Hwang-ho. Owing to the rapidity of the current, the upward traffic is small compared with the downward. Dr. Tafel reckons that in 1904 the flood-water took only five or six days to reach Lung-moen from Lan-chou-fu, though, if this is the case, it is difficult to understand how its temperature is raised to the extent it is. The volume does not seem diminished by evaporation in the interval, in spite of the unimportant nature of

* The same section of the river has lately been visited by two other expeditions—firstly, that of Count von Mutius; and secondly, that of Major MacAndrews and a party of English officers engaged on a survey.

the tributaries received. Dr. Tafel made an excursion westward across the Great Wall, and afterwards made his way north to Kwei-hoa-cheng. He hoped to traverse the Ordos country and Alashan, and to reach Lan-chou-fu by the beginning of last November. He concludes with a few notes on the meteorological conditions in the regions traversed.

German Archæological Expedition to Chinese Turkestan.—In consequence of the archæological discoveries made by Professor Grünwedel at Turfan (Eastern Turkestan) in 1903, the German Government sent an expedition to the same place in the following year under the direction of Dr. A. von Lecoq, of the Royal Prussian Ethnological Museum. Dr. von Lecoq, assisted by Herr Bartus, arrived at Chugutchak in October, 1904, and thence travelled to Kara Khoja (Dakiyanos), in the vicinity of Turfan, remaining there nine months, and excavating a number of caves and stupas. The finds have been most abundant, some hundred boxes of antiquities having been sent to Europe. These antiquities consist of heads of statues, showing Greek and Indian influence, well-preserved wall paintings from ruined temples, coins, and a large quantity of manuscripts in no less than seven kinds of writings, namely, Uigur, Brahmi, Tibetan, Kük Turki, Manichæan (some manuscripts illuminated), Syriac, and Chinese. Dr. von. Lecoq and Herr Bartus left Turfan for Kashgar in October last, and at Kashgar they have been joined by Prof. Grünwedel and Herr Phurt, who have arrived from Berlin *viâ* Russian Turkestan. The party are now preparing to go to Kuchar, where systematic excavations are to be undertaken.

AFRICA.

Opening of the Nile-Red Sea Railway.—This important undertaking, the necessity of which for the commercial development of the Sudan has long been recognized, and which has been quietly and unostentatiously carried into execution during the past few years, was formally opened by Lord Cromer on January 27. The Red sea terminus is at Sheikh Barghut, a spot a few miles north of Suakin, which offers better facilities as a port than any other on this coast, and has been renamed Port Sudan. As is well known, the track runs in great part over a waterless desert, involving unusual difficulties in the way of construction, and the successful accomplishment of the task is a piece of work on which all concerned deserve hearty congratulation. Other extensions of the Sudan railway system are proposed.

M. de Rothschild's Journeys in East Africa.—The *Comptes Rendus* of the Paris Academy of Sciences for December 11 last contain a note by M. Maurice de Rothschild on journeys of zoological research carried out by him in East Africa, which are also of interest geographically, as they led in part over little-known ground. The traveller first landed at Jibuti, making his way to Addis Abbaba, and thence visiting the Soddo country; the return being effected by the Hawash and the Assabot mountains. Lieut. Chollet, who with D. H. Neuville accompanied him on this part of the route, made a map of the region traversed, paying especial attention to the upper course of the Hawash. A nine months' trip in British East Africa was afterwards made in company with Dr. J. Roger. From Mombasa the travellers took the route *viâ* the rift-valley to Baringo, thence crossing the Laikipia and Lorogi ranges* and the Barta steppe, into the Rendile country, through which they made their way to Lake Rudolf. The zoological results of this journey have been very successful. Besides a specimen or specimens of the five-horned giraffe, M. de Rothschild secured several of the newly discovered

* Lorogi is described by Mr. Hobley (*Journal*, vol. 25, p. 294) as a "tabular mass."

Hylochœrus, or forest-pig, representing the animal at various ages. They were obtained in the densest part of the Nandi forest, and the skeletons brought home will permit of the differences from *Potamochœrus* and *Phacochœrus* being laid down with greater precision than hitherto. The collections include the skin and skeleton of the little-known *Boöcercus* (*Tragelaphus*) *euryceros*; the skin of an elephant from Lake Rudolf differing in some respects from other African varieties; and, in particular, a remarkable tusk, which it is difficult to assign to any known animal. It measures 2 feet 4 inches along the curve, and bears certain resemblances to the tusk of an elephant, as also to one of the lower canines of a hippopotamus, which might be supposed to have grown abnormally owing to the absence of the opposing canine of the upper jaw. The mode of insertion, however, and the absence of enamel, are points of divergence from the latter.

Minimum Temperatures in Tropical Africa.—Thanks to the labours of observers in many parts of Tropical Africa, the results of which have been made accessible in the Reports of the British Association, the *Mitteilungen aus den Deutschen Schutzgebieten*, and elsewhere, there now exists a sufficiently large body of data to permit of useful generalizations regarding the climatic features of Tropical Africa. Comparatively little has yet been done in the way of tracing the general laws of climatic distribution deducible from those data, but an interesting attempt in this direction, in regard to one particular feature, has lately been made by Dr. J. Hoffmann, in a series of articles contributed to *Petermanns Mitteilungen* (1905, Nos. 4–7). Dr. Hoffmann has chosen the temperature minima as the subject of investigation, and this is of much interest by reason of the special factors (greater rarity of the air, strong radiation during the twelve-hours' night, etc.) which may bring about a degree of cold sufficient to give rise to unpleasant sensations even on the equator. The area dealt with is the south equatorial region (more particularly the elevated plateau lands of East Africa), and the author discusses the principal subdivisions in turn, tracing the effect on temperature minima and their distribution through the year of such factors as elevation, distance from the sea, rainfall, winds, etc. At the conclusion of the series an attempt is made to deduce the general laws affecting the distribution of the minima. In the horizontal direction the values, as might be expected, diminish with the distance from the coast and the increase of latitude. The altitudinal variation can be brought under no such simple rule, the regular decrease of the values with the altitude being affected by many disturbing factors. The facts are different, *e.g.*, for places situated in a mountain range, on a plateau, or on the slope of an isolated peak rising from a plain; the general law holding good least of all in the case of a mountain region cut up by valleys. Humidity and cloudiness are likewise important disturbing influences, as is well shown by the fact that the minimum of 4° C. (39·2° Fahr.), observed at 1120 metres (3675 feet) in the neighbourhood of Ruwenzori, has never yet been recorded up to a height of 1900 metres (6230 feet) on Kilimanjaro. The important question, from the point of view of agriculture, of the distribution of night frosts, is also considered, and the author concludes that near the equator we have no evidence of actual frost at a lower altitude than 2000 metres (6560 feet), though cold nights with a temperature approaching the freezing-point are not uncommon.

Exploration in the Kamerun.—In the *Deutsches Kolonialblatt* (vol. **16**, No. 17), there is a report by Captain Dominik of an expedition carried out by him into the Bapea country, Kamerun. On January 17, 1905, with 70 coloured soldiers and 50 Bali auxiliaries, Captain Dominik was posted by Balinga ferry on the right bank of the Mbam, ready to start on an expedition to Bapealand. This territory extends some 400 square miles between the Mbam (Sanaga), Bakoko, and Captain Schim, melpfennig's route from Mbam to Yabassi, and has hitherto been almost entirely

unknown. The immediate object of the expedition was to chastise the Bapeas for injuries done by them to the peaceful Yambassas. Sending the caravan by way of Ateba, Captain Dominik, in a canoe, with four Sierra Leone expert watermen, piloted his way from the Nachtigal falls down to the mouth of the Mbam. Below the falls, where, between three islands, the river plunges some 80 feet, the Sanaga is more than 500 yards broad, not deep, but rapid; on one side a dark strip of primeval forest, on the other an undulating grass steppe, with the Mangissa mountains in view to the west. After receiving the Mfamba, the Sanaga is 2½ to 3 miles broad. Everywhere the river abounds in hippopotamus. In the middle of Bapealand the people had not so much as heard of the white man. At the mouth of the Mbam is a strong Haussa settlement, while from the Mbam inland to Siondo is an undulating grassy plain. On February 3 the expedition entered a cultivated plain, where as far as the eye could pierce, up to the bare mountains whose crests were relieved by some oil palms, all was cultivated with the most painstaking industry. The report includes altogether an interesting and fairly detailed account of the land and its inhabitants. Bapea is a region remarkably rich in oil palms, and is densely inhabited by a people of industrious habits. This is an item of no little importance in the Kamerun, in which the success of the plantations, inland trade, and industrial enterprise is all dependent on the labour question. Bapea was further found to have all the conditions requisite for cotton culture, enjoying as it does a longer period of dry weather than the woodland districts of the Yaunde region.

AUSTRALASIA AND PACIFIC ISLANDS.

The British Solomon Islands Protectorate.—Mr. C. M. Woodford's recent report on the British Solomon islands (Colonial Reports, Annual No. 461, 1905) covers a period of two years, 1903–1905, and records for this period a satisfactory increase in trade. During the twelve months ending March 31, 1905, the total trade of the protectorate amounted to £81,061, the exports being valued at £47,405, and imports at £33,656. The whole trade of the protectorate is exclusively done with Sydney, and is shown to compare favourably with the trade between New South Wales and other countries, British and foreign. A direct steamer service to and from the Solomons from Sydney *viâ* Brisbane six times a year commenced from January, 1905. Copra is still the chief article of export, and this, with other exports, on reaching Sydney, is largely re-exported to Europe. A decline is noticeable in the prices offered for pearl shell and other shells, while the quantity of turtle shell shipped has been satisfactory. The coconut-planting industry, by white men, has been largely extended during the period under notice, the area under cultivation having reached 3423 acres. An attempt is now being made to grow cotton, and rubber-growing will shortly be tried, while rice has been successfully grown experimentally. The annual average rainfall at Tulagi for the past seven years (1898 to 1904) was 127·026 inches. Attention is directed to the need of further hydrographical work in the Solomons, more especially between the islands of Guadalcanar and Florida, the most frequented waters of the whole group; a coastal survey of the island of Mala appears to be also greatly needed. The white and foreign population of the protectorate on March 31, 1905, numbered 110, while the native population, roughly estimated, numbers about 150,000.

GENERAL.

The Association of American Geographers.—We are informed that the second annual meeting of the association of the American Geographers was held in New York City, December 26–27, 1905, under the presidency of Prof. W. M. Davis,

of Harvard University, the annual dinner being held at the Hotel Endicott on the evening of December 26. The several phases of geography, particularly the organic, physiographic, and educational, were well represented. About twenty-five papers were read by their authors, and others were read by title. About forty members and invited speakers were present. The association does not sustain any regular publication, but, through the courtesy of the American Geographical Society, the bulletin of that body for February of this year will be mainly devoted to the proceedings of the meeting. The president for 1906 is Mr. Cyrus C. Adams, and the secretary and treasurer, Prof. Albert P. Brigham.

A Photographic Pocket-book.—The 1906 edition of 'Wellcome's Exposure Record and Diary' has just been published by Messrs Burroughs Wellcome & Co. In all important features it is similar to the last edition, but it has been brought up to date. The speed table has received special attention, and a list of English, Continental, and American plates and films has been supplied, giving the latest speeds to be used with Wellcome's Exposure Calculator. As in the 1905 edition, the monthly light tables face the mechanical calculator affixed to the inside of the cover. These light tables, printed on perforated leaves, are so arranged that as each month goes by the corresponding leaf can be removed, disclosing the table for the coming month. There are, as usual, two editions of the book, one for the northern hemisphere and one for the tropics and southern hemisphere. Both are in one style of binding, and published at 1s.

OBITUARY.

Right Hon. Sir Mountstuart E. Grant Duff, P.C., G.C.S.I., F.R.S.

If the available space in our Society's *Journal* permitted any approach to an adequate account of the life of Sir Mountstuart Grant Duff, that task could not, without presumption, be undertaken by one of almost a younger generation, who had not the advantage of knowing him during his parliamentary career. But it can hardly be doubted that before long the memoir of so widely known a personality will be written by some competent hand, and I am unable to resist the view that this brief obituary of one of the most intellectual and cultured of our former presidents should be undertaken by the present occupant of his chair.

Mountstuart Elphinstone Grant Duff, who died on January 12, at the age of nearly seventy-seven, was born in February, 1829. The son of an active and well-known Indian official, who had been Resident at Sattara, he may be said to have inherited an interest in the great dependency with which he was afterwards so closely connected. He was educated at Balliol College, Oxford, where he graduated in 1850, and he was called to the Bar at the Inner Temple in 1854, having obtained a certificate of honour and a studentship in the previous year. Unfortunately, while at Balliol his eyes went seriously wrong, and for the rest of his life he had to work largely with the eyes of others.

With his vivid and alert nature, it was inevitable that he should enter political life, where he could give the fullest satisfaction to his craving to be always in close touch with the social and international problems of his time, as well as with the individuals, in various departments of art and science, who were making history. For he practised to the utmost Pope's dictum, that the proper study of mankind is man; although this did not preclude him from other interests, of which perhaps

The Right Hon. Sir Mountstuart E. Grant Duff,
P.C., G.C.S.I., C.I.E., &c.

the keenest and most enduring was his love of botany. For nearly a quarter of a century, without a break, he represented the Elgin Burghs in Parliament. He served as Under-Secretary of State for India—the country of his predilection—from 1868 to 1874, when the Gladstone ministry fell. He also served as Under-Secretary of State for the Colonies from 1880 until, in 1881, he accepted the governorship of the Madras Presidency.

His knowledge of foreign affairs was probably unsurpassed by any of our countrymen of that period. He not only brought to their study the philosophic mind, the keen perception, and the patient industry which remained unimpaired to his last days, but he devoted the recesses of Parliament to travels on the continent, where he could utilize his social tastes and his remarkable capacity for noting and remembering the opinions of men and women who exercised any material influence on the course of European progress. His annual addresses to his constituents, known as the "Elgin Addresses," were always reproduced by the Press, and were regarded throughout the country as valuable contributions to the knowledge of continental politics. They have still a living interest for those whose inevitable gap between school history and personal knowledge extends from the Crimean war to the Franco-German war. Of the same period and of equal value were two of his works, entitled 'Studies in European Politics,' and 'A Political Survey.' The latter, treating largely of outlying countries, of which, in the sixties, our knowledge was very different from that of to-day, has a strange old-world interest to the reader in the twentieth century.

During the period 1874–80, Mr. Grant Duff produced several works. One of the best known is his 'Miscellanies, Political and Literary' (1878), which includes a specially fine and just estimate of Castelar, beyond question the greatest orator of our time. But Mr. Grant Duff's most delightful book of that period was his 'Notes of an Indian Journey'—a voyage of several months which he undertook immediately on his quitting the India Office in 1874. His pleasure in freedom from the trammels of office and in visiting the country to which his mind had so often turned, breaks out on every page of these 'Notes,' which testify to a *joie de vivre* in the gorgeous East that must have played a considerable part, six years later, in determining him to abandon parliamentary life to become "a providence" for the teeming millions of the Madras Presidency.

The five years (1881–1886) that he spent there as governor were probably the happiest in his life. They were certainly the fullest, as he was untiring in travelling over his Presidency, making himself acquainted with the needs of the people. His administration has always been admitted to have been most successful, and his official minutes are excellent reading, as he issued full reviews of everything done by him for the information of his successors. Yet he found time for much private enjoyment, as he showed in an address delivered before the Society of Arts in February, 1898, entitled 'Recreations of an Indian Official.' In this he characteristically quotes Goethe's saying, "Time is endlessly long, and every day is a vat into which a great deal may be poured if you will only fill it up." Much of the 'Recreations' is occupied with observations on the fauna and flora of his Presidency.

After his return home, he divided his energies between literature and the care of various learned societies. His most attractive book of this period was 'Ernest Rénan' (1893), in which the charm of the great Frenchman seems to have fallen as a mantle on his biographer. Other Memoirs were those of Sir H. S. Maine and Lord de Tabley. The editing of a very full Victorian Anthology occupied considerable time, but was a labour of love. Probably, however, to the general public of to-day, Sir Mountstuart Grant Duff is most intimately known through

his 'Out of the Past' and his 'Notes from a Diary,' the former of which he described "as supplementary to" the latter.

His diary covers a period of half a century, from 1851 up to and including the first meeting of the Privy Council on the morning after the decease of Queen Victoria. With the exception of this historic gathering on the accession of His Majesty, the author carefully excludes from these volumes the official and graver side of his life, and they consequently form an admirable mirror to the opinions and *obiter dicta* of a mass of celebrities during their hours of relaxation. Sir Mountstuart's accuracy of memory and care of detail have given a value to this *olla podrida* of personal reminiscences, which is heightened by the wit and subtlety of the author himself. Accuracy was, indeed, the very breath of his nostrils. In the 'Notes,' he quotes the following passage from Mr. J. A. Froude's legend of St. Neots: "We all write legends. This does not arise from any wish to leave a false impression—scarcely from carelessness—but only because facts refuse to remain bare and isolated in our memory. Facts are thus perpetually, so to say, becoming unfixed and rearranged in a more conceptional order;" to which Sir Mountstuart adds, "It would be difficult to put more distinctly the way in which we should *not* deal with facts." This absolute accuracy of statement added incalculably to the charm of Sir Mountstuart's conversation. His apt references to some bygone facts or sayings were always clear-cut and convincing, while they sparkled with wit and delicate humour.

To deal briefly with his connection with learned bodies—he had been in his earlier days Lord Rector of the Aberdeen University; he became a member of the Senate of the University of London in 1891; he was President of the Royal Historical Society from 1892 to 1899; he was the King's trustee of the British Museum from 1903; and, finally, he was President of our Society from 1889 to 1893. He retired owing to a difference of opinion amongst our Fellows as to the advisability of admitting lady travellers to Fellowship in the Society. His presidency was marked by great energy and ability, while his public addresses were always of deep interest. At the conclusion of one of these, his predecessor —the late Lord Aberdare, himself a man of high culture and intellect—struck the keynote of Sir Mountstuart's power. He said, "To those who can read between the lines, almost every paragraph of the address shows a man who has spent his life in the constant acquisition of various knowledge." Sir Mountstuart was keenly alive to the necessity of more time being given in schools to the study of history and geography, "those twin brethren, Castor and Pollux." In one of his addresses to us (June, 1892), he said, "Put composition in the ancient tongues, as a piece of regular school business, behind the fire," and he added that there would then be "time to read a great deal more of the classics than there is now, and to teach as much history and geography as any one wishes to teach a boy under eighteen or nineteen." He continued to the last to watch with interest the growth of geographical knowledge. On his death, he had been a Fellow of our Society for forty-five years.

Following the practice of our *Journal*, this obituary must be confined to Sir Mountstuart Grant Duff's public life; but his large circle of friends know that, well filled as that public life was, he displayed his greatness of soul and his personal charm no less consistently in his private life, to which it was an honour to be admitted. Although he was not one of those who "suffer fools gladly," his essentially kind nature displayed itself both in personal intercourse and in his writings, and perhaps his most appropriate epitaph would be the quotation from Rénan which he selected as a preface to his Notes from a Diary: "On ne doit jamais écrire que de ce qu'on aime. L'oubli et le silence sont la punition qu'on inflige à ce qu'on a trouvé laid ou commun dans la promenade à travers la vie."

GEORGE TAUBMAN GOLDIE.

Admiral Lindesay Brine.

The Society has lost a Fellow of just fifty years' standing in the person of Admiral Lindesay Brine, who died at Torquay on February 2, in his seventy-second year. Entering the navy in 1847, he served in the *Leander* in 1854, during the operations in the Black sea, and five years later did good work in China during the war of 1859–60, being in command of the *Opossum* at the capture of the Peiho forts in the latter year. While serving in the Far East, he took much pains to collect accurate information on the troubles then prevailing, and in 1862 published the results of his observations and inquiries in a volume entitled 'The Taeping Rebellion in China.' In 1870 he travelled extensively in Central America, visiting many of the sites of ancient cities made known to the world by Mr. J. L. Stephens, besides studying with much care the populations and general conditions of some of the least-known regions of Guatemala, which he crossed from the Pacific to the Atlantic. In 1872 he read a paper before the Society on "The ruined cities of Central America," which was printed in the *Journal* for that year, while in 1894 he brought out a detailed account of his researches under the title, 'Travels amongst American Indians.' Admiral Brine was also engaged in operations for the suppression of the slave trade on the African coasts, and took part in Sir D. Forsyth's mission to Mandalay in 1875. He had served for some years on the Council of the Society—in 1886–89, and again in 1893–94.

The Rev. James Stewart, D.D., LL.D.

We regret to record the death, on December 21, 1905, of the Rev. James Stewart, commonly known as "Stewart of Lovedale," from the spot in South Africa where the best part of his life's work was accomplished. Dr. Stewart will long be remembered as the man who above all others contributed to the education and civilization of the South African races through the splendid work done at Lovedale, founded in 1824 by missionaries of the Glasgow Missionary Society, and which, since being placed under his charge in 1866, has developed into the most important institution of its kind in the whole of South Africa, capable of supplying a thoroughly practical education to one thousand boys and girls, gathered from no fewer than fifteen distinct tribes. Dr. Stewart was born at Edinburgh in 1831, and, after travelling extensively in Europe and South America, became known to geographers for the visit of inspection which he paid to the Zambezi during Dr. Livingstone's second expedition to that river, with a view to the establishment of an industrial mission on the shores of Lake Nyasa. Although his decision was at the time unfavourable, the idea bore fruit eventually, for, returning to Lake Nyasa in 1875, he took part in the launch of the first steamer, the *Ilala*, on its waters, and succeeded in establishing the flourishing Livingstonia mission. At the time of his death he was engaged in elaborating a scheme for a college, which should supply a thoroughly sound "higher education" to the natives of South Africa. Dr. Stewart was a life Fellow of the Society, having joined it forty years ago.

James Bonwick.

Mr. James Bonwick, the well-known writer on topics connected with the history of Australasia, died at Southwick, Sussex, on February 6, at the advanced age of eighty-eight years. Mr. Bonwick, who was born in London, though of a Sussex family, emigrated to Tasmania in 1841, being one of the earliest settlers. In this and other of the Australasian colonies he spent many years of active life, devoted

to a variety of pursuits, and materially adding by his writings to our knowledge of that part of the British Empire. Returning to this country in 1884, he eventually became archivist to the Government of New South Wales, and was actively engaged until 1902 in the preparation of an official history of that colony. Among his other works, we may mention 'The Last of the Tasmanians' and 'Daily Life and Origin of the Tasmanians' (both published in 1870); 'The British Colonies and their Resources,' 4 parts (1886); 'First Twenty Years of Australia' (1882); and 'The Port Philip Settlement' (1883). He also discussed questions concerning the voyages of Captain Cook. Mr. Bonwick became a Fellow of the R.G.S. in 1865.

CORRESPONDENCE.

Currents in the Arctic Ocean.

U.S. Coast and Geodetic Survey,
Washington, D.C., U.S.A., January 25, 1906.

Upon p. 5 of the present volume of your magazine there is an implication that I have considered the currents passing through Bering strait to be of great importance in the circulation of the Arctic ocean. A perusal of the paper there referred to, or of the slightly extended version of this paper found in the 'Report of the Eighth International Geographic Congress' (p. 397), will show that the streams considered are surface currents (or drifts) belonging almost entirely to the Arctic ocean, and that no mention is made of the Bering strait currents. I called special attention to the fact that the *Jeannette* drifted very slowly at first, and quite rapidly later on, and used this fact as an argument in favour of land to the northward of Bennett island. It never occurred to me that the Bering strait current had any sensible influence upon this drift.

R. A. Harris.

The Indian Ocean Expedition.

In the current number of the *Journal* there is a notice of observations made by the Indian Ocean Expedition, and amongst other things mentioned is that "Near Providence . . . a dredging at 744 fathoms brought up 5 cwt. of stones. . . . Some masses looked like solidified ash or clay, while others appeared like volcanic bombs."

You may think it worth recording in this connection that on December 3, 4, and 5, 1883, the s.s. *Chimborazo* of the Orient line, homeward bound from Australia *viâ* the canal, passed through wide fields of floating pumice-stone at about this point. To be nearly correct, the vessel's route was along the customary course steering for Socotra. The pumice-stone, commencing at lat. 13° S., continued to be met with for 500 miles, often for hours without intermission.

I happen to have preserved an outline route-map as supplied to the ship's passengers, and recorded these notes at the time. The view we formed was that the Krakatoa catastrophe at the Sunda strait, some 1800 miles to eastward, must have been the source of the drift. The eruption had occurred in the last week of the preceding August, a little over three months before.

Charts of the Indian ocean on sufficient scale show, I think, a Sargasso sea at about the point where the pumice was encountered. What the ultimate destination of this refractory flotsam coming to a rest in this mid-ocean pool would be, seems to afford matter for a rather interesting speculation.

Frederick Kinnard.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1905-1906.

Sixth Meeting, January 29, 1906.—The Right Hon. Sir GEORGE T. GOLDIE, K.C.M.G., D.C.L., LL.D., F.R.S., President, in the Chair.

ELECTIONS:—*Frederick Gerald Apthorpe, M.A.; Frank Baden-Powell; Walter John Barton, B.A.; Leonard Frank Beatson; Lieut.-Colonel Vere Bonamy Fane, 21st (P.A.V.O.) Cavalry, F.F.; Ernest Edward Lupton; Captain E. V. Manger (Durham Light Infantry); Alfred William Oke, B.A., LL.M., F.G.S.; Colonel Herbert C. Surtees, D.S.O.; Bertram Tanner Tanner; Major Arthur Sale Warwick (3rd P.W.O. West Yorks).*

The paper read was:—

"The Geographical Functions of Certain Water-plants in Chile." By Prof. G. F. Scott Elliot.

RESEARCH DEPARTMENT.

January 31, 1906.

"Suggestions as to an Inquiry into the Resources of the British Empire." By Prof. G. F. Scott Elliot.

February 9, 1906.

"The Ruins of Rhodesia and the probable date of Outside Intrusion in Africa." By D. Randall MacIver.

Seventh Meeting, February 12, 1906.—The Right Hon. Sir GEORGE T. GOLDIE, K.C.M.G., D.C.L., LL.D., F.R.S., President, in the Chair.

ELECTIONS:—*William Patrick Anderson; H. R. C. Dobbs, C.I.E.; Captain A. H. W. Grubb, D.S.O.; Alfred Stanley Haile; A. N. Homer; Chas. F. Croyndon Luxmore; Rev. Robert Kennedy Mackay; George W. C. Pim; Rev. Robert Austin Thomson; George Ryan Twomey.*

The paper read was:—

"The Wreck of the Spanish Armada on the Coast of Ireland." By the Rev. W. Spotswood Green, Chief Inspector of Irish Fisheries.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Col. = Colonies.
Com. = Commerce.
C. R. = Comptes Rendus.
E. = Erdkunde.
G. = Geography, Géographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
Jb. = Jahrbuch.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. (Mém.) = Memoirs, Mémoires.
Met. (mét.) = Meteorological, etc.
P. = Proceedings.
R. = Royal.
Rev. (Riv.) = Review, Revue, Rivista.
S. = Society, Société, Selskab.
Sc. = Science(s).
Sitzb. = Sitzungsbericht.
T. = Transactions.
Ts. = Tijdschrift, Tidskrift.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE.

Germany—Coasts. **Fülscher.**

Ueber Schutzbauten zur Erhaltung der Ost- und Nordfriesischen Inseln. Von Fülscher. Berlin: W. Ernst & Sohn, 1905. Size 10½ × 7½, pp. 186. *Maps. Price 5s.*

Contains much valuable information on coast erosion.

Germany—Elbe. *Ann. Hydrographie* **33** (1905): 435–454. **Hambruch.**

Die Eisverhältnisse auf der Unterelbe. Von P. Hambruch. *With Map and Diagrams.*

Germany—Hanover. 11 *Jahresb. G. Ges. Hanover*, 1898–1905: 84–89. ——

Die Erdöl-Industrie von Wietze-Steinförde. *With Illustrations.*

Germany—Magnetism. **Neumayer.**

Eine erdmagnetische Vermessung der bayerischen Rheinpfalz 1855–56. Von Dr. G. von Neumayer. (M. d. Pollichia, No. 21, LXII. Jahrg. 1905.) Bad Dürkheim, 1905. Size 11½ × 9, pp. iv., 80, and lxii. *Maps. Presented by the Author.*

Germany—Paper Industry. **Ward.**

German Paper Industry and Export Trade. Foreign Office, Miscellaneous, No. 642, 1905. Size 9½ × 6½, pp. 14. *Price 1d.*

Germany—Rainfall. *Petermanns M.* **51** (1905): 193–197. **Polis.**

Die wolkenbruchartigen Regenfälle am 17. Juni 1904 im Maas-, Rhein- und Wesergebiet. Von Dr. P. Polis. *With Maps.*

Hungary. *Math. u. Naturw. Berichte Ungarn* **20** (1902): 328–331. **Bernátsky.**

Über die Pflanzenformationen des Lokvagebirges bei Baziás und Fehértemplom. Von Dr. J. Bernátsky.

Italy—Arno. *B.S.G. Italiana* **6** (1905): 739–761, 893–921. **Baratta.**

Leonardo da Vinci negli studi per la navigazione dell' Arno. Ricerche del M. Baratta. *With Maps and Facsimiles.*

Italy—Sicily. *Atti R.A. Lincei, Rendiconti* **14** (2) (1905): 309–315. **Venturi.**

Nuove determinazioni di gravità relativa in Sicilia. Nota del A. Venturi.

Italy—Vesuvius. *Nature* **72** (1905): 455–456. **Günther.**

Recent Changes in Vesuvius. By R. T. Günther. *With Illustrations.*

Mediterranean—Cyprus. **Dunstan.**

Cyprus. Report by Prof. Wyndham Dunstan, F.R.S., on the Agricultural Resources of Cyprus, with special reference to Cotton Cultivation, and Correspondence relating thereto. London: Wyman & Sons, 1905. Size 13 × 8½, pp. iv. and 30. *Map. Price 5d.*

Mediterranean—Cyprus. **Bellamy and Jukes-Browne.**

The Geology of Cyprus. By C. V. Bellamy and A. J. Jukes-Browne. Plymouth: W. Bendon & Son, 1905. Size 10 × 6½, pp. 72. *Maps and Sections. Price 3s. 6d.*

Montenegro. *Petermanns M.* **51** (1905): 180–186, 197–202. **Baldacci.**
Die Arbeiten der beiden italienischen Studienmissionen 1902 und 1903 in Montenegro. Von Prof. Dr. A. Baldacci.

Montenegro. *Petermanns M.* **51** (1905): 203–206. **Hassert.**
Topographische Aufnahmen in Montenegro. Von Prof. Dr. K. Hassert. *With Map.*

Pyrenees. **Stuart-Menteath.**
Pyrenean Geology. By P. W. Stuart-Menteath. Part i. The Alpine Paradoxes (pp. 16); Part ii. Scenery in Science (pp. 12); Part iii. The Pyrenean Paradoxes (pp. 20); Part iv. The Structure of the Pyrenees (pp. 28); Part v. Engineering Geology in the Pyrenees (pp. 28). London: Dulau & Co., 1903–1905. Size 8½ × 5½.

Rumania. **Sturdza.**
Alexandre A. C. Sturdza. La Terre et la Race Roumaines depuis leurs origines jusqu'à nos jours. Paris: L. Laveur, 1904. Size 10 × 6½, pp. xvi. and 724. *Maps and Illustrations. Price* 20 *fr.*
A systematic account of Rumania under all aspects.

Russia. **Meakin.**
Russia: Travels and Studies. By Annette M. B. Meakin. London: Hurst & Blackett, 1906. Size 9½ × 6, pp. xx. and 450. *Maps and Illustrations. Price* 16*s. net. Presented by the Publishers.* [To be reviewed.]

Russia—Finland—Languages. *Ymer* **25** (1905): 132–149. **Wiklund.**
Språken i Finland 1880–1900. Af K. B. Wiklund. *With Maps.*

S.E. Europe. **Cora.**
Guido Cora. Fra gli Slavi Meridionali. Un' escursione in Croazia e in Serbia (1902). Roma, 1904. Size 9½ × 6½, pp. 90. *Illustrations. Presented by the Author.*

Spain—Forestry. *Ann. G.* **14** (1905): 318–331. **Cavaillès.**
La question forestière en Espagne. Par H. Cavaillès.

Spain—Galicia. *B.R.S.G. Madrid* **47** (1905): 372–450. **Garcia de la Riega.**
Oestrymnis-Ophiusa (Geografia antigua de Galicia). Por C. Garcia de la Riega. *With Maps.*

Spain—La Mancha. *B.R.S.G. Madrid* **47** (1905): 307–333. **Blázquez.**
La Mancha en tiempo de Cervantes. Por A. Blázquez. *With Map and Illustrations.*

Sweden. **Andersson.**
Das nacheiszeitliche Klima von Schweden und seine Beziehungen zur Florenentwickelung. Von Dr. G. Andersson. (Separatabdruck aus Bericht VIII. der zürcherischen botanischen Gesellschaft 1901–1903.) Zürich-Oberstrass, 1903. Size 9 × 6½, pp. 18. *Maps.*
Another paper by Dr. G. Andersson on the same subject was referred to in the *Journal* for January, 1904 (p. 94).

Switzerland. **Heim.**
Beiträge Geol. Karte Schweiz (N.F.) **16** Lief. (1905): pp. x. and 654.
Das Säntisgebirge, untersucht und dargestellt von Dr. A. Heim. *Text and Atlas.*

Turkey—Macedonia. *Globus* **88** (1905): 293–295. **Groos.**
Die Murichowo, ein Gebiet für deutsche Forschung und Unternehmung. Von Dr. W. Groos. *With Illustration.*

United Kingdom—Coal. *Quarterly Rev.* **203** (1905): 136–165. ———
The National Coal-supply.
Based chiefly on the recent reports of the Royal Commission.

ASIA.

Chinese Empire—Mongolia. *Missions en Chine* **17** (1905): 272–275. **Botty.**
Mongolie Sud-Ouest (Ortos). Lettre du P. Botty. Un voyage en barque Chinoise sur le Fleuve Jaune.

Chinese Empire—Tibet. *Quarterly Rev.* **203** (1905): 192–220. **Eliot.**

The Buddhism of Tibet. By Sir C. N. Eliot, K.C.M.G.

Chinese Empire—Tibet. *Indian Antiquary* **34** (1905): 203–210. **Francke.**

Archæological Notes on Balu-mkhar in Western Tibet. By the Rev. A. H. Francke. *With Plan and Illustrations.*

Chinese Empire—Tibet. *J. Asiatic S. Bengal* **73**, Pt. 1 (1904): 362–367. **Francke.**

A language map of West Tibet with notes. By A. H. Francke. *With Map.*

Dutch East Indies. **Weber.**

Ein Jahr an Bord I.M.S. *Siboga.* Von Frau A. Weber—*van Bosse.* Beschreibung der Holländischen Tiefsee-Expedition im Niederländisch-Indischen archipel. 1899-1900. Nach der 2. Aufl. aus dem Holländischen übertragen von Frau E. Ruge—*Baenziger.* Leipzig: W. Engelmann, 1905. Size 8½ × 6¼, pp. xiv. and 370. *Map and Illustrations. Price* 6*m. Presented by the Publisher.*

An interesting account of the Dutch hydrographical expedition to the Malay archipelago. The scientific results (which are exhaustively described in the series of monographs now in course of publication) are frequently touched upon in a way suitable to the general reader.

Eastern Asia—Sakhalin. *Questions Dipl.* **20** (1905): 422–435. **Labbé.**

Sakhaline. Par P. Labbé. *With Map.*

French Indo-China. *B.S.G. Marseille* **29** (1905): 143–159. **Barthelémy.**

Les chemins de fer et les transports maritimes en Indo-Chine. Conférence du Marquis de Barthélemy. *With Maps.*

French Indo-China—Tongking. *B.S.G. Marseille* **29** (1905): 204–213. **Mercier.**

Souvenirs du pays Muong (Haut-Tonkin). Par le Dr. M. Mercier.

India. **[Stock.]**

Notes on India for Missionary Students, London, Church Missionary Society, 1905. Size 8½ × 6½, pp. 112. *Maps. Price* 1*s. Presented by the Church Missionary Society.*

India—Anthropology. *J. Asiatic S. Bengal* **73**, Pt. 3 (1904): 39–56. **Friend-Pereira.**

Totemism among the Khonds. By J. E. Friend-Pereira.

India—Assam. *J. Asiatic S. Bengal* **73**, Pt. 3 (1904): 57–74. **Gurdon.**

Note on the Khasis, Syntengs, and allied Tribes, inhabiting the Khasi and Jaintia Hills district in Assam. By Major P. R. T. Gurdon. *With Plates.*

India—Bengal. *J.S. Arts* **54** (1905): 102–124. **Bourdillon.**

The Partition of Bengal. By Sir J. Bourdillon. *With Map.*

India—Burma. *J. China Br. R. Asiatic S.* **36** (1905): 1–35. **Carey.**

Notes of a Journey overland from Szemao to Rangoon. By F. W. Carey. *With Map.*

The journey was made in 1902.

India—Madras. **Francis.**

Madras District Gazetteers. Anantapur. By W. Francis. 2 vols. vol. 1 (pp. xii. and 216 maps), vol. 2 (pp. iv. and 44); North Arcot, vol. 2 (pp. 54); South Arcot, vol. 2 (pp. iv. and 52); Bellory, 2 vols., vol. 1 (pp. xiv. and 342, map), vol. 2 (pp. iv. and 40); Chingleput, vol. 2 (pp. iv. and 46); Coimbatore, vol. 2 (pp. 50); Cuddapah, vol. 2 (pp. 48); Madura, vol. 2 (pp. iv. and 62); Nilgiri, vol. 2 (pp. iv. and 36); Trichinopoly, vol. 2 (pp. iv. and 46). Madras, 1904–1905. Size 10 × 6½.

India—Nagarcain. *J. Asiatic S. Bengal* **73**, Pt. 1 (1904): 276–281. **Fanthome.**

A Forgotten City. By J. F. Fanthome.

On the city of Nagarcain, founded by Akbar, but very soon abandoned to oblivion.

India—North-west Frontier. *J. R. Artillery* **32** (1905): 417–432. **MacMunn.**

The North-West Frontier of India. By Major G. F. MacMunn. *With Map.*

India—North-West Frontier and Baluchistan. **Stein.**

Report of Archæological Survey Work in the North-West Frontier Province and Baluchistan for the period from January 2, 1904, to March 31, 1905. By M. A. Stein, PH.D. Peshawar, 1905. Size 13 × 8½, pp. vi. and 56. *Plans and Illustrations. Presented by the Author.*

Reviewed in the present number (p. 292).

India—Pondicherry. *Tour du Monde* **11** (1905): 529–540. **Verschuur.**

Pondichéry, chef-lieu de l'Inde française. Par G. Verschuur. *With Illustrations.*

India—Rajputana. **Watson.**

Rajputana District Gazetteers. Ajmer-Merwara. Vol. **1**.—A. Text (pp. x., 138, and vi.); vol. **1**.—B. Statistical Tables (pp. vi. and 38). Compiled by C. C. Watson. Ajmer, 1904. Size 10 × 6½. *Map. Presented by the Secretary of State for India.*

India—United Provinces. **Nevill.**

District Gazetteers of the United Provinces of Agra and Oudh. Vol. **34**, Naini Tal (pp. 330, xxxiv., and viii.); vol. **39**, Rai Barelli (pp. 230, xliv., and viii.); vol. **41**, Hardoi (pp. 276, xlvi., and viii.); vol. **47**, Partabgarh (pp. 222, xlii., and vi.); vol. **48**, Bara Banki (pp. 288, xlii., and vi.). Compiled and edited by H. R. Nevill. Allahabad, and Naini Tal, 1904–1805. Size 9 × 5½. *Maps.*

Japan. **Mitford.**

A New Geography of Japan for the Upper Forms of Schools and Colleges. By C. B. Mitford. Yokohama: *Japan Gazette*, [*not dated*]. Size 9 × 6½. *Maps and Illustrations. Presented by the Author.*

The section on physical geography, which might with advantage have been placed earlier in the book, gives on the whole a good description of the surface features. The rest of the book is rather too much of the nature of a catalogue of names, and the whole suffers somewhat from undue compression.

Japan—Luchu Islands. *J. China Br. R. Asiatic S.* **36** (1905): 103–119. **Leavenworth.**

The History of the Loochoo Islands. By C. S. Leavenworth.

Japan—Paper-making. **White.**

Japanese Paper-making. Foreign Office, Miscellaneous, No. 635, 1905. Size 9½ × 6½, pp. 16. *Price* 1*d.*

Malay Peninsula. **Martin.**

Die Inlandstämme der Malayischen Halbinsel. Wissenchaftliche Ergebnisse einer Reise durch die Vereinigten Malayischen Staaten. Von Dr. Rudolf Martin. Jena: G. Fischer, 1905. Size 11½ × 8, pp. xiv. and 1052. *Map and Illustrations. Price* 60*s.* [To be reviewed.]

Pamirs. **Olufsen.**

Gennem Pamir. Rejser i verdens mærgtigste Bjærglande. Af O. Olufsen. København: H. Hagerup, 1905. Size 9 × 6, pp. 236. *Map and Illustrations. Presented by the Publisher.*

Narrative of the Second Danish Pamir Expedition.

Persia. *M.V.E. Leipzig*, 1904 (1905): xxxiii.–xxxviii. **Mann.**

Reisen im westlichen Persien. Von Prof. Dr. O. Mann.

Philippine Islands. **Le Roy.**

Philippine Life in Town and Country. By J. A. Le Roy. New York and London: G. P. Putnam's Sons, 1905. Size 7½ × 5, pp. x. and 312. *Map and Illustrations. Price* 5*s. net. Presented by the Publishers.*

An interesting, and apparently trustworthy, account of native life in the Philippines. There are chapters on the racial elements, the typical Philippine community, religion in the islands, and other subjects.

Russia—Caucasus. **Déchy.**

Kaukasus. Reisen und Forschungen im Kaukasischen Hochgebirge. Von M. von Déchy. Vols. **1** and **2**. Berlin: Dietrich Reimer (Ernest Vohsen), 1905-6. Size 12 × 9, pp. (vol. 1) xviii. and 348; (vol. **2**) xx. and 396. *Maps and Illustrations. Price* 40*m. Presented by the Publisher.* [To be reviewed.]

Russia—Caucasus. **Levier.**

Émile Levier. A travers le Caucase. Notes et Impressions d'un Botaniste. 2me édn. Paris: Librairie Fishbacher, [*not dated*]. Size 10 × 7, pp. 346. *Map and Illustrations. Presented by the Publisher.*

A pleasantly written account of journeys undertaken primarily for botanical study.

Western Asia. **Zugmayer.**

Eine Reise durch Vorderasien im Jahre 1904. Von Dr. E. Zugmayer. Berlin: Dietrich Reimer (Ernst Vohsen), 1905. Size 10 × 7, pp. xii. and 412. *Maps and Illustrations. Price* 12*m. Presented by the Publisher.*

Account of journeys undertaken for purposes of study with a special view to

zoology. The book is, however, useful as giving a picture of the present position of affairs in some of the less visited districts of Persia and Turkey.

AFRICA.

Africa. **Bozas.**

Mission Scientifique Du Bourg de Bozas. De la Mer Rouge à l'Atlantique à travers l'Afrique Tropicale (Octobre 1900—Mai 1903). Carnets de Route. Préface de M. R. de Saint-Arroman. Paris: F. R. de Rudeval, 1906. Size 11½ × 7½, pp. viii. and 442. *Maps and Illustrations. Price* 30 *fr. Presented by the Publisher.* [To be reviewed.]

Congo State. *Mouvement G.* **22** (1905): 535–539. **Hendrickx.**

Une excursion dans la région des Banfunuka. Par le Père F. X. Hendrickx. *With Map.*

The district lies to the west of the lower Kwango.

Egypt. **Felix.**

Studien über tertiäre und quartäre Korallen und Riffkalke aus Ägypten und der Sinaihalbinsel. Von Johannes Felix. (Sonder-Abdruck aus der Zeitschrift der Deutschen geologischen Gesellschaft, Bd. 56, 1904.) Size 5½ × 5½, pp. (39). *Illustrations.*

Egypt. **Partsch.**

Ägyptens Bedeutung für die Erdkunde. Antrittsvorlesung bei der Einführung in das geographische Lehramt an der Universität Leipzig am 13. Mai 1905, gehalten von Prof. Dr. J. Partsch. Leipzig: Veit & Co., 1905. Size 8 × 5½, pp. 40. *Price* 1*s.*

Egypt—Nubia. **Kumm.**

Versuch einer wissenschaftlichen Darstellung der wirtschaftsgeographischen Verhältnisse Nubiens von Assuan bis Dongola. Von H. K. W. Kumm. Gotha, 1903. Size 9 × 5½, pp. 66. *Map and Diagram. Presented by the Author.*

A careful study of the economic conditions of Nubia.

Egyptian Sudan. *Climate* **5** (1905): 274–286. ——

The Climate of the Upper Nile. A summary of the available evidence concerning the health conditions of the Bahr-el-Gebel. *With Maps and Illustrations.*

French Congo. *Mouvement G.* **22** (1905): 480–484. **Brazza.**

La mission De Brazza au Congo français.

French Sudan. *B.S. d'Etudes Col.* **12** (1905): 449–523. **Buret.**

Le Territoire français Niger-Tchad. Par — Buret. *With Maps and Illustrations.*

French Sudan. **Decorse.**

Renseignements Col., Comité Afrique Française (1905): 189–197, 221–227, 268–275.

Rapport économique et zoologique sur la région du Tchad. Par Dr. Decorse.

German East Africa. *Globus* **88** (1905): 197–201, 222–226. **Booth.**

Das Nachkommen der Sulukaffern (Wangoni) in Deutsch-Ostafrika. Von J. Booth.

German East Africa. *Deutsch. Kolonialblatt* **16** (1905): 598–602, 636–637. **Chrapkowski.**

Aus dem Bericht des Regierungsrats Chrapkowski über seine Expedition vom Viktoria-Njansa (Bukoba) zum Tanganjika (Usumbura).

German South-West Africa. *M.V.E. Leipzig,* 1904 (1905): xxx.–xxxii. **Passarge.**

Deutschsüdwestafrika und der Aufstand der Herero. Von S. Passarge.

German South-West-Africa and Algeria. ——

Deutsch. Kolonialblatt **16** (1905): 606–609.

Vergleiche zwischen den Vegetationsverhältnissen in Deutsch-Südwestafrika und Algier.

Kamerun. *M.V.E. Leipzig,* 1904 (1905): xxvii.–xxx. **Ramsay.**

Meine letzten Reisen im Schutzgebiete Kamerun 1900–1904. Von Hauptmann H. Ramsay.

Lake Chad. *La G., B.S.G. Paris* **12** (1905): 305–320. **Audoin.**

Notice hydrographique sur le lac Tchad. Par — Audoin.

Will be specially noticed.

Morocco. **René-Leclerc.**

Renseignements Col., Comité Afrique Française (1905): 229–253, 295–321, 337–350.

Le commerce et l'industrie à Fez. Rapport au Comité du Maroc. Par C. René-Leclerc. *With Plan.*

Natal. **Evans.**

The Problem of Production in Natal. By M. S. Evans. Durban: P. Davis & Sons, 1905. Size 7½ × 5, pp. 52. *Presented by the Author.*

North Africa—Historical. ——

Epistola Potentissimi ac Inuictissimi Emanuelis Regis Portugallie et Algarbior:, etc. De Victoriis nup: in Affrica habitis. Ad S. in xp̃o patrem et dn̄m nostrum dn̄m Leonē X. Pont. Max. [Facsimile of 1513 edition.] Lisboa, 1905. Size 8½ × 6, pp. 8. *Presented by Sr. E. do Canto.*

Portuguese Guinea. *B.S.G. Marseille* **29** (1905): 214–231. **Giraud.**

La Guinée portugaise. Par J. E. Giraud.

Rhodesia. *J. Anthrop. I.* **35** (1905): 92–102. **Hall.**

Stone Fort and Pits on the Inyanga Estate, Rhodesia. By R. N. Hall. *With Plans and Illustrations.*

Rhodesia. *Deutsch. Rundschau G.* **27** (1905): 446–451. **Bencke.**

Avembaland und seine Bewohner. Von A. Bencke. *With Map.*

Rhodesia—Language. **Madan.**

Senga Handbook. A short introduction to the Senga Dialect as spoken on the Lower Luangwa, North-Eastern Rhodesia. By A. C. Madan. Oxford: Clarendon Press, 1905. Size 7 × 5, pp. 100. *Price 2s. 6d. net. Presented by the Publishers.*

NORTH AMERICA.

United States—California. *Nautical Mag.* **74** (1905): 978–987. **Spadoni.**

San Francisco as a Harbour and Shipping Centre. By A. Spadoni. *With Illustration.*

United States—Cities. *B. American G.S.* **37** (1905): 577–588. **Tower.**

The Geography of American Cities. By W. S. Tower.

United States—Cities. ——

Dep. Commerce and Labor, Bureau of the Census, B. **20** (1905): pp. 482.

Statistics of Cities having a population of over 25,000, 1902 and 1903.

CENTRAL AND SOUTH AMERICA.

Brazil. **Grossi.**

Prof. Dott. Vincenzo Grossi. Storia della colonizzazione Europea al Brasile e della emigrazione Italiana nello Stato di S. Paulo. Roma: [E. Loescher & Co.], 1905. Size 7½ × 5, pp. 592. *Price 8s. Presented by the Publishers.*

Chile—Historical. **Arana.**

Historia Jeneral de Chile. Por Diego Barros Arana. Tomo xvi. (i ultimo). Santiago, 1902. Size 10 × 7, pp. 394. *Map.*

Costa Rica. *B.R.S.G. Madrid, Rev. G. Col.* **3** (1905): 157–169. ——

La República de Costa Rica: población, agricultura, comercio, vias de comunicación, hacienda y situación general.

Panama Canal. *National G. Mag.* **16** (1905): 445–467. **Chester.**

The Panama Canal. By Rear-Admiral C. M. Chester. *With Map and Illustrations.*

Peru and Bolivia. *La G., B.S.G. Paris* **12** (1905): 289–296. **Nordenskiöld.**

Exploration scientifique au Pérou et en Bolivie (1904–1905). Par E. Nordenskiöld. *With Illustrations.*

Peru and Bolivia. *Ymer* **25** (1905): 265–312. **Nordenskiöld.**

Beiträge zur Kenntnis einiger Indianerstämme des Rio Madre de Dios Gebietes. Von E. Nordenskiöld. *With Map and Illustrations.*

South America. **Martin.**

Through Five Republics (of South America). A Critical Description of Argentina, Brazil, Chile, Uruguay, and Venezuela in 1905. By Percy F. Martin. London: W. Heinemann, 1905. Size 9½ × 6, pp. xxiv. and 488. *Maps and Illustrations. Price 21s. net.*

South America—Ethnology. **Ehrenreich.**

Die Mythen und Legenden der Südamerikanischen Urvölker und ihre Beziehungen zu denen Nordamerikas und der alten Welt. Von Dr. P. Ehrenreich. (Supplement zu *Zeitschrift für Ethnologie*, 1905.) Berlin: A. Asher & Co., 1905. Size 10½ × 7, pp. 106. *Price* 3*s.*

AUSTRALASIA.

Pacific Islands—Botany. **Guppy.**

Observations of a Naturalist in the Pacific between 1896 and 1899. By H. B. Guppy. Vol. 2, Plant-dispersal. London: Macmillan & Co., 1906. Size 9½ × 6½, pp. xxvi. and 628. *Maps and Illustrations. Price* 21*s. net. Presented by the Publishers.* [To be reviewed.]

POLAR REGIONS.

Arctic—Eskimo. *Ymer* **25** (1905): 173–192. **Simmons.**

Eskimåernas forna och nutida utbredning samt deras vandringsvägar. Af H. G. Simmons. *With Maps and Illustrations.*

On the past and present distribution of the Eskimo and their migrations.

Arctic—Eskimo. **Steensby.**

Om Eskimokulturens Oprindelse. En etnografisk og antropogeografisk studie. Af H. P. Steensby. København: Brød. Salmonsens Boghandel (I. Salmonsen), 1905. Size 9½ × 6½, pp. 220. *Presented by the Author.*

Arctic—Hudson Bay. *Quarterly J.R. Met. S.* **31** (1905): 317–326. **Hepworth**

Climatological Observations at an Arctic Station in Repulse Bay. By Commander M. W. C. Hepworth. *With Diagrams.*

The observations were taken by Captain J. A. Murray in the winter and spring of 1903–4.

Arctic—North-East Passage. *Ann. Hydrographie* **33** (1905): 483–497. **Herrmann.**

Die Bedeutung der Nordostdurchfahrt für die Schiffahrt. Von J. Hermann.

Arctic—Voyage of the "Vega." *Ymer* **25** (1905): 121–131. **Hovgaard.**

Vegafärden. Minnesord på 25te årsdagen af Vegas återkomst till Stockholm. Af A. P. Hovgaard.

Address in memory of the voyage of the *Vega* on the twenty-fifth anniversary of the return of the famous ship.

Greenland—Glaciers. *M.K.K.G. Ges. Wien* **48** (1905): 426–433. **Engell.**

Einige Beobachtungen über die Kalbungen im Jakobshavner Eisfjorde und den benachbarten Fjorden. Von Dr. M. C. Engell.

Polar Regions. *La G., B.S.G. Paris* **12** (1905): 321–327. **Rabot.**

Projet d'exploration systématique des régions polaires. Par C. Rabot.

On the proposed International Association for the study of the polar regions.

MATHEMATICAL GEOGRAPHY.

Astronomy. **Kobold.**

Der Bau des Fixsternsystems mit besonderer Berücksichtigung der photometrischen Resultate. Von Dr. H. Kobold. (Die Wissenschaft, Heft 2.) Braunschweig: F. Wieweg und Sohn, 1906. Size 9 × 5½, pp. xii. and 256. *Illustrations. Price* 5*m.* 60. *Presented by the Publishers.*

PHYSICAL AND BIOLOGICAL GEOGRAPHY.

Hydrology. *Minutes of P.I. Civil Engineers* **161** (1905): 345–349. **Hill.**

The velocity of water flowing down a steep slope. By E. P. Hill.

Limnology. *Petermanns M.* **51** (1905): 258–259. **Aufsess.**

Untersuchungen über die Erhöhung der Temperatur am Grunde der Seen. Von Dr. O. Frhr. v. u. z. Aufsess.

Meteorology. **Billwiller.**

Der Bergeller Nordföhn. Inaugural-Dissertation . . . von R. Billwiller. (Sonder-Abdruck aus den Ann. Schweiz. met. Centralanstalt, Jahrg. 1902.) Zürich, 1904. Size 12 × 10, pp. 56. *Diagrams.*

Meteorology. *B. Musée Océanograph. Monaco*, No. 44 (1905): pp. 8. **Hergesell.**

La Situation actuelle et quelques Problèmes futurs de la Météorologie maritime. Exposé présenté à S.A.S. le Prince Albert de Monaco. Par H. Hergesell.

Meteorology. *Met. Z.* **22** (1905): 398–412. **Meinardus.**

Ueber Schwankungen der nordatlantischen Zirkulation und damit zusammenhängende Erscheinungen. Von Dr. W. Meinardus.

Meteorology. *Nature* **73** (1905): 54–56. **Rotch and Bort.**

The Exploration of the Atmosphere over the Tropical Oceans. By Dr. A. L. Rotch and L. Teisserenc de Bort. *With Diagrams.*

Seismology. **Ballore.**

F. de Montessus de Ballore. Les Tremblements de Terre. Géographie seismologique. Avec une Préface par M. A. de Lapparent. Paris: A. Colin, 1906. Size 19 × 6½, pp. vi. and 476. *Maps. Price* 12 *fr. Presented by the Publisher.* [To be reviewed.]

ANTHROPOGEOGRAPHY AND HISTORICAL GEOGRAPHY.

Historical—Early Voyages. **Raleigh.**

The English Voyages of the Sixteenth Century. By Walter Raleigh. Glasgow: J. MacLehose & Sons, 1906. Size 8½ × 5½, pp. 206. *Frontispiece. Price* 4*s.* 6*d. net. Presented by the Publishers.*

A most interesting account of the beginnings of British maritime enterprise, looked at not as mere historical facts, but in their relation to the life and growth of the nation.

Historical—Humboldt's Travels. **Hamy.**

Lettres américaines d'Alexandre de Humboldt (1798–1807). Précédées d'une Notice de J. C. Delamétherie et suivies d'un Choix de documents en partie inédits. Publiées avec une Introduction et des Notes par le Dr. E. T. Hamy. Paris: E. Guilmoto, [1904]. Size 9 × 5½, pp. xl. and 310. *Map. Price* 7 *fr.* 50.

A collection of letters, never before brought together, which originally appeared in French, German, and Spanish journals during the course of the American journeys.

Historical—Triremes. **Cook.**

Triremes. By A. B. Cook. (From the *Mid-Tyne Link*, vol. 2, No. 6, 1905.) Newcastle-upon-Tyne. Size 9½ × 6½, pp. 69–81. *Illustrations. Presented by the Editor.*

See note in the December number (p. 678).

BIOGRAPHY.

Varenius. **Günther.**

Varenius. Von Prof. Dr. S. Günther. (Klassiker der Naturwissenschaften herausgegeben von L. Brieger-Wasservogel. IV. Bd.) Leipzig: T. Thomas, [1905]. Size 9 × 6, pp. 218. *Price* 3 *m.* 60 *pf. Presented by the Publisher.*

GENERAL.

Mediterranean Lands. **Fischer.**

Mittelmeerbilder. Gesammelte Abhandlungen zur Kunde der Mittelmeerländer. Von Dr. T. Fischer. Leipzig und Berlin: B. G. Teubner, 1906. Size 9 × 6, pp. vi. and 480. *Price* 7*s.* [To be reviewed.]

Physiological Geography. **Zuntz and others.**

Höhenklima und Bergwanderungen in ihrer Wirkung auf den Menschen. Ergebnisse experimenteller Forschungen im Hochgebirge und Laboratorium. Von Dr. N. Zuntz, Dr. A. Loewy, Dr. F. Müller, Dr. W. Caspari. Berlin, etc.: Bong & Co., 1906. Size 11½ × 8½, pp. xvi. and 494. *Illustrations. Price* 18*s.*

Tables. **Martin.**

Martin's Tables, or "One Language in Commerce," containing tables and information upon Imperial, Metric, Indian, and Colonial Measures and Weights, Simple suggestions for Metric adoption, Imperial Decimal Coinage, Foreign, Indian, and Colonial Moneys, Standard Time, Decimalization of the Circle, Compass, etc. By A. J. Martin. London: T. Fisher Unwin, 1906. Size 6 × 4½, pp. 272. *Price* 2*s.* 6*d. Presented by the Publisher.*

A revised edition of these useful tables.

Year-book. **Ito.**

The World Year-book for 1905. Compiled by S. Ito. [In Japanese.] Size 10½ × 7½. *Maps and Illustrations. Presented by the Compiler.*

Year Book. **Wagner.**

Geographisches Jahrbuch, xxviii. Bd. 1905. Herausgegeben von H. Wagner. 1. Hälfte. Gotha: J. Perthes, 1905. Size 9 × 6, pp. 290.

This part contains reports on progress in Ethnology, Geophysics, Ancient Geography, and Phytogeography.

NEW MAPS.

By E. A. REEVES, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Ordnance Survey.**

ORDNANCE SURVEY OF ENGLAND AND WALES:—Sheets published by the Director-General of the Ordnance Survey, Southampton, from January 1 to 31, 1906.

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In outline, 40, 1*s.* (engraved).
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England and Wales. **Geological Survey.**

Maps—**1 inch**—New Series (colour printed):—
341, West Fleet (Dorset). Drift edition. 1*s.* 6*d. each.*

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France. **Ministre de l'Intérieur, Paris.**

Carte de la France dressée par ordre du Ministre de l'Intérieur. Scale 1: 100,000 or 1 inch to 1·6 stat. mile. Sheets (new editions): V.-17, Quimperlé; VI.-18, Vannes; XXI.-25, Lyon (Nord-Ouest). Paris: Ministère de l'Intérieur, Service Vicinal, 1905. *Price* 0.80 *fr. each sheet.*

Germany. **K. Preussische Landesaufnahme.**

Karte des Deutschen Reiches. Herausgegeben von der Kartographischen Abteilungen der Königlichen Preussische Landesaufnahme. Scale 1 : 100,000 or 1 inch to 1·6 stat. mile. Sheet (brown hills and contours) 359, Uslar. Berlin: K. Preussische Landesaufnahme, 1905. *Price* 1.50 *mark each sheet.*

ASIA.

Philippine Islands. **U.S. Post Office Department.**

Post Route Map of Philippine Islands, showing Post Offices in operation on September 1, 1905. Published by order of Postmaster-General Geo. B. Cortelyou, under the direction of A. von Haake, Topographer P.O. Dept. Scale 1 : 823,680 or 1 inch to 13 stat. miles. 2 Sheets. Washington: Post Office Department, 1905. *Presented by the Fourth Assist.-Postmaster-General, Washington, U.S.A.*

A most useful map for general reference. It is clearly drawn, printed in colours, but without hill-shading, which is a decided advantage in a map of this character. Railways, postal routes, telegraph cables, and much other information will be found on the map.

Singapore. **Surveyor-General, Straits Settlement.**

Map of the Island of Singapore and its dependencies. Scale 1 : 63,360 or 1 inch to a stat. mile. 2 Sheets. Singapore: Surveyor-General's Office, 1904. *Price* 11*s.* 6*d.*

This is a revised edition of a map first published in 1898. It shows forest reserves, railways, roads, trigonometrical stations, boundaries, and other information. The map is printed in colours, but is somewhat rough in appearance.

AFRICA.

Africa. **Topographical Section, General Staff.**

Map of Africa. Compiled in the Topographical Section, General Staff. Scale 1 : 1,000,000 or 1 inch to 15·8 stat. miles. Sheet 123, Angra Pequena. London: Topographical Section, General Staff, War Office, 1906. *Price* 2*s. each sheet. Presented by the Director of Military Operations.*

Africa. **Topographical Section, General Staff.**

Map of Africa. Compiled in the Topographical Section, General Staff. Scale 1 : 250,000 or 1 inch to 3·9 stat. miles. Sheets: (Gold Coast), 60-G, 60-K, 60-L. London: Topographical Section, General Staff, War Office, 1906. *Price* 1*s.* 6*d. each sheet. Presented by the Director of Military Operations.*

Khartum. **Stanton.**

Provisional Map of Khartum City, Khartum North, and Omdurman. Scale 1 : 253,440 or 1 inch to 4 stat. miles. Compiled for use of the Khartoum Mudiria, by Lieut.-Colonel E. A. Stanton, Governor Khartum Province. 2 Sheets.

Colonel Stanton has compiled this map from various sources. A prismatic-compass sketch, by Captain Morant, serves as the basis of the Omdurman section; Khartum city, and Khartum North have been taken from a survey by Mul Awal Muhd eff Samaha, whilst the land between the White and Blue Niles is from a survey by Mustafa Bey Ramzi. The map is well drawn and carefully printed, and although it is stated to be only a provisional publication, it supplies a felt need, and will doubtless be of great service.

AMERICA.

Bolivia. **Hoek and Steinmann.**

Routenkarte der Expedition Steinmann, Hoek, v. Bistram in den Anden von Bolivien, 1903–04. Entworfen von H. Hoek und G. Steinmann. Scale 1 : 750,000, or 1 inch to 11·8 stat. miles. 2 sheets. *Petermanns Mitteilungen*, Jahrgang, 1906, Tafeln 1 u. 2. Gotha: Justus Perthes, 1906. *Presented by the Publisher.*

A brief account of the work accomplished by this expedition was given to this Society by Dr. Hoek in his paper published in the *Geographical Journal* for May, 1905. At that time the complete map had not been compiled, and that illustrating the paper was only a provisional sketch. However, since then the map has been finished and is now published in two sheets, with a paper, in *Petermanns Mitteilungen*. The geology of the country traversed is indicated on the maps, not by colouring, as is usually the case, but by notes. Although not professing to be any more than a route map, a considerable amount of information is given.

British Guiana. **Harrison and Anderson.**

Map of portions of the lower Essequibo and Cuyuni Rivers in the Colony of British Guiana, showing the geological formations along the courses of the rivers. From observations made by J. B. Harrison, C.M.G., M.A., F.G.S., Government Geologist, and C. W. Anderson, F.G.S., F.R.G.S., Government Surveyor. Scale 1:126,720, or 1 inch to 2 stat. miles. Georgetown, Demerara, 1905. *Presented by H.M. Secretary of State for the Colonies.*

Considerable interest was centred in this region a few years ago owing to the dispute concerning the boundary between British Guiana and Venezuela which was finally settled by arbitration. Had the Venezuelans succeeded in establishing their original claim, the whole of the bed of the Cuyuni would have been lost to British gold-mining enterprise.

This is an outline map of the rivers, with geological colouring along their beds and for a short distance from their banks. The Essequibo and Mazaruni rivers, and the Cuyuni river as far as the Kamaria road, are from surveys on record in the Department of Lands and Mines at Demerara. The Oko, Arrawak, Matope, Quartz Stone, Kopang, and Waiamu creeks, placers and paths thereto are adapted from route surveys furnished by the late Mr. R. B. Greene, government officer, and Mr. H. Fernandes, warden of the district.

The Groete creek, its tributaries and paths leading to them, the Cuyuni river from Kamaria road to Akarabisi and Arimu creek, are from compass and time surveys made between positions determined astronomically by Mr. C. W. Anderson.

Canada. **Dept. of the Interior, Ottawa.**

Sectional Map of Canada. Scale 1:190,080, or 1 inch to 3 stat. miles. Sheets: 265, Peace hills, revised to October 23, 1905; 266, Ribstone creek, revised to October 23, 1905; 269, Prince Albert south, revised to November 20, 1905; 217, Tramping lake, revised to November 20, 1905. Ottawa: Department of the Interior, Topographical Surveys Branch, 1905. *Presented by the Canadian Department of the Interior.*

Panama. **U.S. Post Office Department.**

Post Route Map of the Canal Zone and its Municipal Districts, Isthmus of Panama, showing Post Offices with the Intermediate Distances on Mail Routes in operation on September 1, 1905. Published by order of Postmaster-General Geo. B. Cortelyon, under the direction of A. von Haake, Topographer P.O. Dept. Scale 1:100,000, or 1 inch to 1·6 stat. mile. Washington: Post Office Department, 1905. *Presented by the Fourth Assistant Postmaster-General, Washington, U.S.A.*

This is an interesting plan. The line of the proposed canal is shown in red, and the rivers blue. No attempt has been made to indicate hill features, except that a few of the principal peaks are hachured. The map will be useful for reference, specially as it also shows the limits of the canal zone and its municipal districts.

Porto Rico. **U.S. Post Office Department.**

Post Route Map of Porto Rico, showing Post Offices with the Intermediate Distances on Mail Routes in operation on September 1, 1905. Published by order of Postmaster-General Geo. B. Cortelyon, under the direction of A. von Haake, Topographer P.O. Dept. Scale 1:316,800 or 1 inch to 5 stat. miles. Washington: Post Office Department, 1905. *Presented by the Fourth Assistant Postmaster-General, Washington, U.S.A.*

An outline map without hills, showing railways, postal and mail routes. Upon the latter, by different symbols, is indicated the frequency of mails and other information.

PACIFIC OCEAN.

Hawaii, etc. **U.S. Post Office Department.**

Post Route Map of the Territory of Hawaii, Samoan Islands, and the Island of Guam, showing Post Offices with the Intermediate Distances on Mail Routes in operation on September 1, 1905. Published by order of Postmaster-General Geo. B. Cortelyon, under the direction of A. von Haake, Topographer P.O. Dept. Scale 1:570,240 or 1 inch to 9 stat. miles. Washington: Post Office Department, 1905. *Presented by the Fourth Assistant Postmaster-General, Washington, U.S.A.*

This map is similar in style to those of Porto Rico and the Philippines, and shows a considerable amount of postal information. A special feature is the manner in which the frequency of mails is indicated by the symbols employed for the routes.

GENERAL.

World. **Schrader.**

L'Année Cartographique. Supplement annuel à toutes les publications de Géographie et de Cartographie, dressé et rédigé sous la direction de F. Schrader. Quinzième Année contient les modifications géographiques et politiques de l'année 1904. Paris: Hachette et Cie., 1905. *Price* 3 *fr.*

This fifteenth issue of Schrader's "L'Année Cartographique," gives a brief summary of the more important geographical explorations, surveys, and modifications to boundaries during the year 1904. It is similar in style and arrangement to previous issues. There are three sheets—one devoted to Asia, another to Africa, and the third to America. The Asia sheet gives maps illustrating the explorations of M. V. Obrontcheff in Northern China, Lieut. Oum in Indo-China, and Captains Rawling and Hargreaves in Western Tibet. In addition to these there are three small insets showing the progress of triangulation in Indo-China.

The Africa sheet contains a map of Lake Chad by Lieut. Boudry, a map showing the explorations of Commandant Laperrine and others in the Sahara, a sketch showing the new political division in French West Africa, from sketch-maps showing the modifications to French and British possessions in West Africa, and a small inset of the Los islands.

The third sheet, devoted to America, contains two maps, one showing the Appalachian mountains and the Canadian Great lakes from the U.S. Coast and Geodetic Surveys, and the other a sketch-map illustrating the surveys of Drs. Steinmann, Hoek, and Bistram, and of F. O'Driscoll in Argentina and Bolivia.

The back of each map contains brief descriptive notes upon the principal geographical work of the year in each of the continents dealt with.

CHARTS.

North Atlantic and Mediterranean. **Meteorological Office.**

Pilot Chart of the North Atlantic and Mediterranean for February, 1906. London: Meteorological Office, 1906. *Price* 6*d.* *Presented by the Meteorological Office.*

North Pacific. **U.S. Hydrographic Office.**

Pilot Chart of the North Pacific Ocean for February, 1906. Washington: U.S. Hydrographic Office, 1906. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Bombay Presidency. **Varley.**

Five photographs of Satara and Mahableshwar, Bombay Presidency, taken by F. G. Varley, Esq. *Presented by F. G. Varley, Esq.*

Mr. Varley has sent these photographs as a first instalment in response to a special request for views of India for the Society's collection. Whilst we have many photographs of the frontier and trans-frontier regions of India, very few have been presented of the peninsula itself. The titles are as follows:—

(1) Collecting branches broken off by locusts; (2) Tree broken to pieces by the weight of locusts sitting on it; (3) Locusts eating scrub jungle, Satara; (4) Locusts fighting, Mahableshwar; (5) Mahableshwar, saddle-back hill in distance.

China. **Turley.**

Fourteen photographs of Peking and Mukden. *Presented by R. T. Turley, Esq.*

The views of the Imperial tombs and summer palace are of special interest. Upon all the photographs Mr. Turley has written full descriptions, from which the following short titles have been taken:—

(1) The new Legation street, Peking; (2 and 3) Lake within the palace grounds, Peking; (4) Outside wall of palace enclosure, Peking; (5) The summer palace, near Peking; (6) The tomb of Wen Wang, the builder of Mukden city; (7) The Great Wall at Shan-hai-kuan; (8) Great East street, Mukden; (9 to 14) The Imperial Manchu tombs, Mukden.

Japan. **Ponting.**

Twenty-five reproductions of Fuji San, from photographs by H. G. Ponting, Esq. *Presented by H. G. Ponting, Esq.*

This is an album of excellent photographic reproductions of Japan's most famous

mountain, and its beautiful surroundings. The points from which the views have been taken have evidently been carefully selected, and the pictures are most artistic in effect.

Kashmir. **Ferber.**

Ninety-five photographs of the Karakoram Himalayas, taken by Herr A. C. F. Ferber. *Presented by Herr A. C. F. Ferber.*

The expedition of Messrs. Honigmann and Ferber to the Karakorum Himalaya last year, like that of Dr. and Mrs. Workman, supplements the work of Sir Martin Conway in 1892, and the photographs mentioned below, which were taken upon the expedition, form a most valuable addition to the large number taken by Sir Martin Conway and deposited with the Society. The photographs are excellent quarter-plates, and have been bound in an album by Mr. Ferber, who has also taken pains to carefully name and describe them.

(1) Landing near Bandipur, Wular lake; (2) On the Gilgit road; (3) Dak bungalow, Burzil pass; (4) View across the Deosai plateau; (5–8) View from top of Burji La, towards Deosai; (9–12) View from top of Burji La, towards Indus valley; (13) Skardo; (14) The polo ground at Skardo; (15) The meteorological observatory at Skardo; (16) Junction of the Skoro and Shigar valleys; (17) Looking up the Skoro valley; (18) Gorge in the Skoro valley; (19) Looking down the Skoro valley; (20) Summit of Skoro La; (21–23) View from Skoro La, looking south towards Deosai; (24–26) View from Skoro La, looking north towards Askole; (27) Snowy peak on north side of Skoro La; (28) Our party descending north side of Skoro La; (29) First view of Askole; (30) Looking up the Braldu valley; (31) Rope bridge across the Braldu river; (32) Houses, Askole; (33) Men from Askole; (34) Distributing flour; (35) Old fortification of Askole; (36) The Braldu valley near Askole; (37) The Braldu river; (38–43) Panorama from the Laskam pass; (44) Korofon; (45) Crossing the Dumordo river; (46) Braldu river above Bardumal; (47) Sir M. Conway's Rochester crags; (48) Foot of Baltoro glacier; (49) Camp at foot of Baltoro glacier; (50) Our party on the moraine of Baltoro glacier; (51) Ice blocks broken off; (52) Peak, Baltoro glacier; (53) Peaks on right bank of Baltoro glacier; (54) Chober Zechen Luma; (55) Part of Chober Zechen lake; (56) Uli Biaho Luma; (57) Trahonge Luma; (58) Talve Luma; (59) Piale Luma; (60) Looking down the Baltoro glacier from Ordokas; (61) Masherbrum; (62) Curious ice-formation on the Baltoro glacier; (63) Looking up the Baltoro glacier; (64) Looking down the Mustagh Luma from Mustagh Spangla; (65) Looking up the Mustagh Luma; (66) Old huts above Mustagh Spangla; (67) Camp Lobsana Blangsa; (68) Looking down the Mustagh valley; (69) Mustagh Circus; (70) The Mustagh pass; (71) Seven pagodas; (72) Tower glacier; (73) Rocks between Tower and Snake glaciers; (74) Snake glacier and Black tooth; (75) East border of Mustagh Luma; (76) Ascent of the Mustagh Pir; (77) The north side of Neptune; (78) Looking down the Mustagh Luma; (79) Snake glacier; (80) Our sick; (81) Lobsana Blangsa kitchen; (82) Sunset at Lobsana Blangsa; (83) Our stoneman at Lobsanga Blangsa; (84) Fresh snow on the Baltoro glacier; (85) Lake at the foot of Bio glacier; (86) Street in Askole; (87) Braldu valley below Askole; (88) Braldu valley near Pakora; (89) Our party on the road to the Shigar valley; (90) A bridge constructed by us across the Braldu; (91) Gomboro; (92) Raft on the Shigar river; (93) E. Honigmann; (94) A. Ferber.

Somaliland. **Swayne.**

Seven photographs of camels and watering-places of the Haud, Somaliland, taken by Brigadier-General E. J. E. Swayne, C.B. *Presented by Brigadier-General E. J. E. Swayne, C.B.*

Typical photographs of camels and watering-places in the barren region of the Haud, which has to be traversed by caravans going to the south of British Somaliland.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

THE MEKEO AND INAUVORENE DISTRICTS

from a survey by

W. Mersh Strong, M.A.,M.D.

1904.

Scale 1. 250,000 or 3·94 Stat. Miles = 1 Inch.

2 1 0 5

Explanation

Government roads shown thus ——

Native " " " - - - -

Points astronomically determined for latitude and longitude thus ⊕

Heights in feet

Between the astronomically determined positions the map is based upon a prismatic compass traverse

146° 30′ 146° 40′ 152°

8° 20′ 8° 30′ 8° 40′ 5° 40′ 152°

R. Inawa

Village

Inauvorene

Tulli

1650

1079

Peaks

R. Uisi

R. Aopi

To Biaru R.

Iriru

Inawauni

Ngangahua or Agabunga R.

Rarai

Inawabui Kianga

Bebeo

Amoamo

R. St. Joseph

Vaia

Aipiana

Mekeo

(Gov. Sta.)

Oropetana

Inawi

Inawae

Iesu

Baibua

Maiva (Waima)

Eboa

Inawaia

Berana

Rabiko

Inawabui Kipo

Poimo Cr.

Mou

To Epa

Oropetana Cr.

Rapa

Bioto

Epa

Suangwai Pt.

Tree Rock Pt.

(Rogau)

Old bed

Numerous sm

well a

Cor

Den

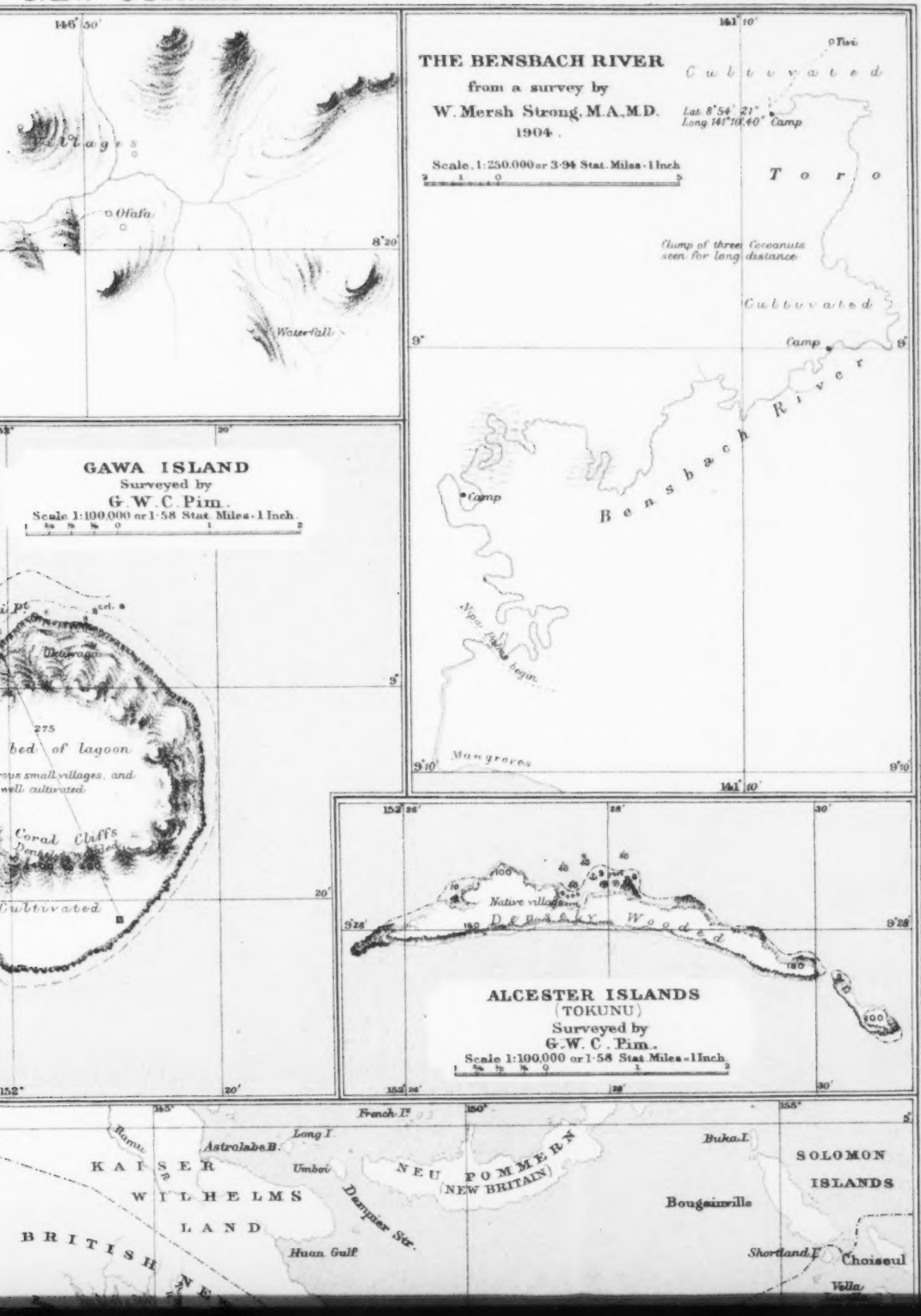
Cult

DUTCH NEW GUINEA

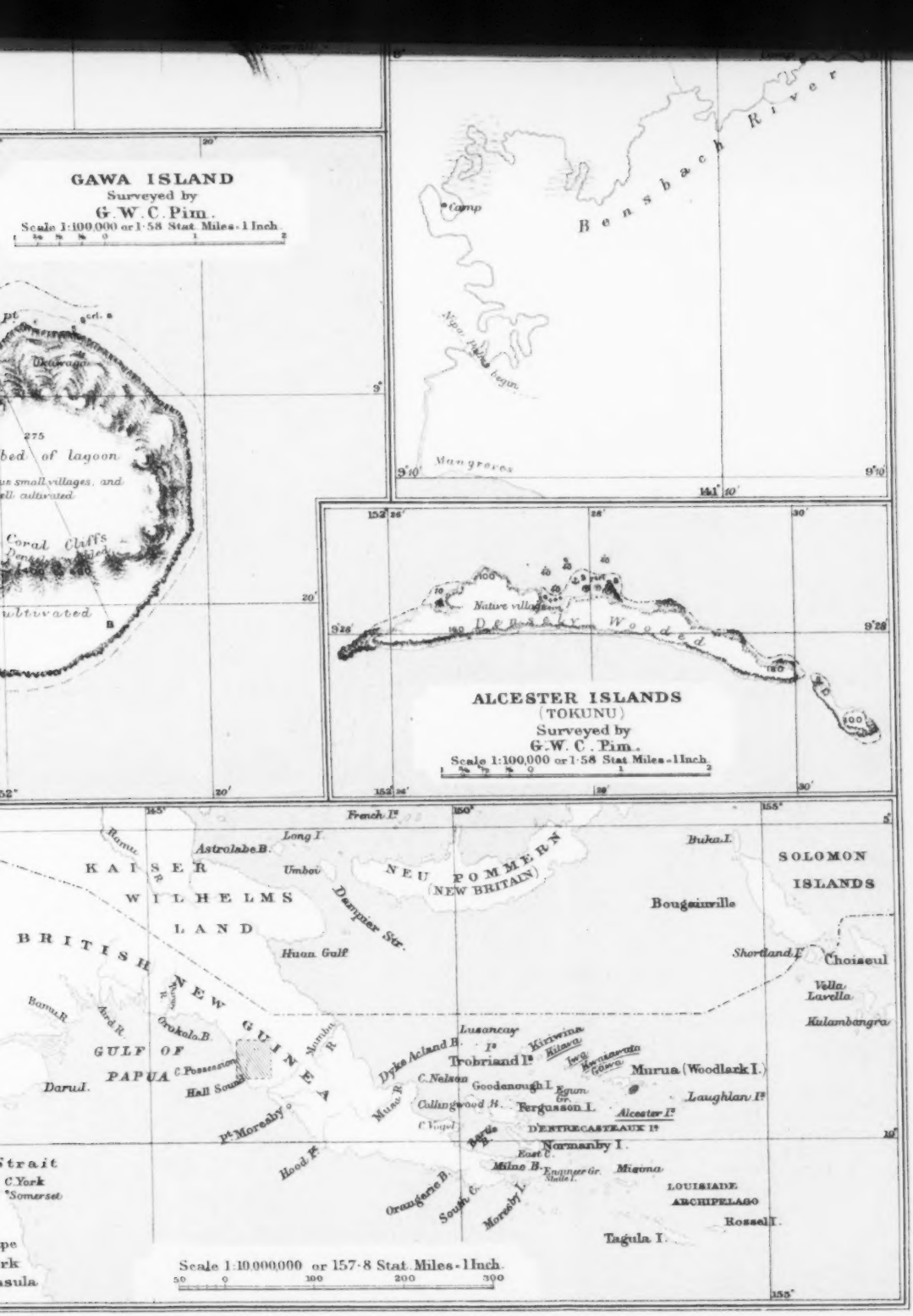
Strickland

B

NEW GUINEA


146° 50'
Villages
Ofafa
8°20'
Waterfall
THE BENSBACH RIVER
from a survey by
W. Mersh Strong, M.A., M.D.
1904.
Lat. 8°54' 21"
Long. 141°10.40" Camp
Scale 1:250,000 or 3·94 Stat. Miles = 1 Inch
2 1 0 5
Tivi
Cultivated
Toro
Clump of three Cocoanuts seen for long distance
Cultivated
Camp
9°
Bensbach River
Mangroves
9°10'
141° 10'
GAWA ISLAND
Surveyed by
G. W. C. Pim.
Scale 1:100,000 or 1·58 Stat. Miles = 1 Inch
Deduragai
275
bed of lagoon
Coral Cliffs
Cultivated
20'
152°
ALCESTER ISLANDS
(TOKUNU)
Surveyed by
G. W. C. Pim.
Scale 1:100,000 or 1·58 Stat. Miles = 1 Inch
Native village
Wooded
9°28'
152° 26'
28'
30'
French I.
150°
155°
5°
Ramu R.
Astrolabe B.
Long I.
KAISER WILHELMS LAND
Umboi
NEU POMMERN
(NEW BRITAIN)
Dampier Str.
Huon Gulf
BRITISH NEW
Buka I.
SOLOMON ISLANDS
Bougainville
Shortland I.
Choiseul
Vella

latitude and longitude thus
Heights in feet
Between the astronomically determined
positions the map is based upon a
prismatic compass traverse
Peaks
1079
1070
R. Ufafa
R. Aopi
To Biaru R.
Ififu
Inawawa
Nyangaihia or
Aagabunga R
Rarei
Inawabui
Kianga
Bebeo
Amoamo
R. St. Joseph
Vefa
Aipiana
Mekeo
(Gov. Stn.)
Oropetana
Inawi
Inawae
Jesu
Baibua
Eboa
Inawaia
Maiva
(Waima)
Berana
R. St. Joseph
Bubiko
Inawabui Kupo
Poimo Cr.
Mou
To Epa
Epa
Oropokano Cr.
Rapa
Bioto
Bioto Cr.
Pinupaka
Roro Ituna Pt.
Au Pt.
Siritoi
R. Ufafa
HALL
SOUND
Roro or Lolo I.
(Yule I.)
Aruapaka
Chiria
Pokao
Ma ula
334
French Mission
Sta.
Pt. Leon
Mauru Pt.
Pokama
Delena
Mava R.
8°30
8°40
8°50
146°30'
146°40'
Suungwai Pt.
Tree Rock Pt.
(Ragau)
Old bed
Numerous small
well cult
Cora
Reef
Cultiv
5°
10'
20'
40'
152°
140°
DUTCH
NEW
GUINEA
Strickland
Fly River
Bensbach R.
Morehead R.
Clarence Is.
Torres Stra
Pr. of Wales Is.
C. York
"Some
QUEENSLAND Cape
York
Peninsula
KWAIAWATA ISLAND
East & West
Feet
600
400
200
0


GAWA ISLAND
Surveyed by
G.W.C. Pim.
Scale 1:100,000 or 1·58 Stat. Miles - 1 Inch.
Camp
Bensbach River
Mangroves
Coral Cliffs
bed of lagoon
ALCESTER ISLANDS
(TOKUNU)
Surveyed by
G.W.C. Pim.
Scale 1:100,000 or 1·58 Stat. Miles - 1 Inch.
Native village
Woodland
BRITISH NEW GUINEA
KAISER WILHELMS LAND
NEU POMMERN
(NEW BRITAIN)
SOLOMON ISLANDS
Astrolabe B.
Long I.
Umboi
Huon Gulf
Dampier Str.
French I.
Buka I.
Bougainville
Shortland I.
Choiseul
Vella Lavella
Kulambangra
GULF OF PAPUA
Port Moresby
Hall Sound
Orokolo B.
Aird R.
Bamu R.
Dyke Acland B.
Lusancay
Kiriwina
Trobriand Is.
Kitava
Iwa
Boyowa
Gawa
Murua (Woodlark I.)
C. Nelson
Goodenough I.
Egum
Fergusson I.
Laughlan Is.
Collingwood B.
Alcester I.
D'ENTRECASTEAUX Is.
Normanby I.
East C.
Milne B.
Engineer Gr.
Misima
LOUISIADE ARCHIPELAGO
Rossel I.
Tagula I.
Hood Pt.
Orangerie B.
South C.
Moresby I.
Strait
C. York
Somerset
Scale 1:10,000,000 or 157·8 Stat. Miles - 1 Inch.
IWA ISLAND
N.W. & S.E.
KITAVA ISLAND
North
Feet
400
200
0

latitude and longitude thus
Heights in feet
between the astronomically determined
positions the map is based upon a
prismatic compass traverse

Peaks

R. Vaifa

R. Aopi

Te Buaru R.

Ritu

Nyangafina or Rarua

Inawuum

Aagabunga R.

Inawaba

Riamoa

Rebeo

Amoamo

R. St. Joseph

Vaita

Melkeo

Aptana

Oropokana

Inawa

Inawai

Jean Baibua

Ebon

Inawaua

Mawa

Bereina

R. St. Joseph

Babiko

Inawaibu Rapo

Poumo Cr.

Mou

Te Epa

Epa

Oropokano Cr

Rapa

Biuto

Pmupaka

Biuto Cr.

R. Vaifa

Roro Ituna Pt.

Ao Pt.

Sivita

HALL SOUND

Roro or Lolo I. (Yule I.)

Aruapaka

Chiria

Pokao

Ma ula

334

Pt. Leon

Maura Pt.

Pokaina

Delena

Mawa R.

146° 30'

8° 30'

Sumgwau Pt.

Tree Rock Pt. (Ragau)

Old bed

40'

152°

DUTCH NEW GUINEA

Strickland

Fly River

Bensbach R.

Morehead R.

Clarence Is.

Torres Strait

Pr. of Wales Is.

C. York

Somerset

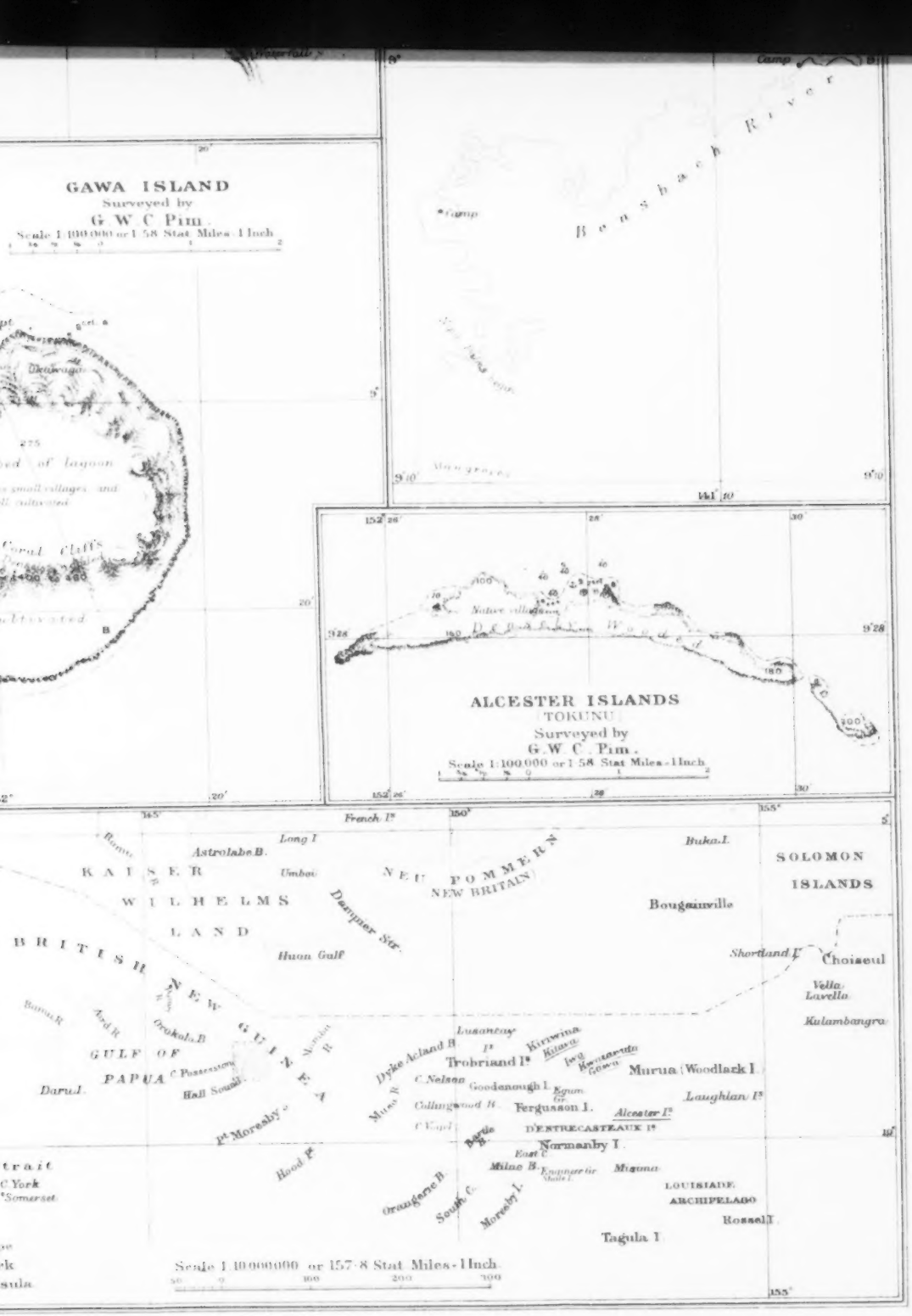
QUEENSLAND Cape York Peninsula

140°

KWAIAWATA ISLAND
East & West

Feet
500
300
200
0

GAWA ISLAND

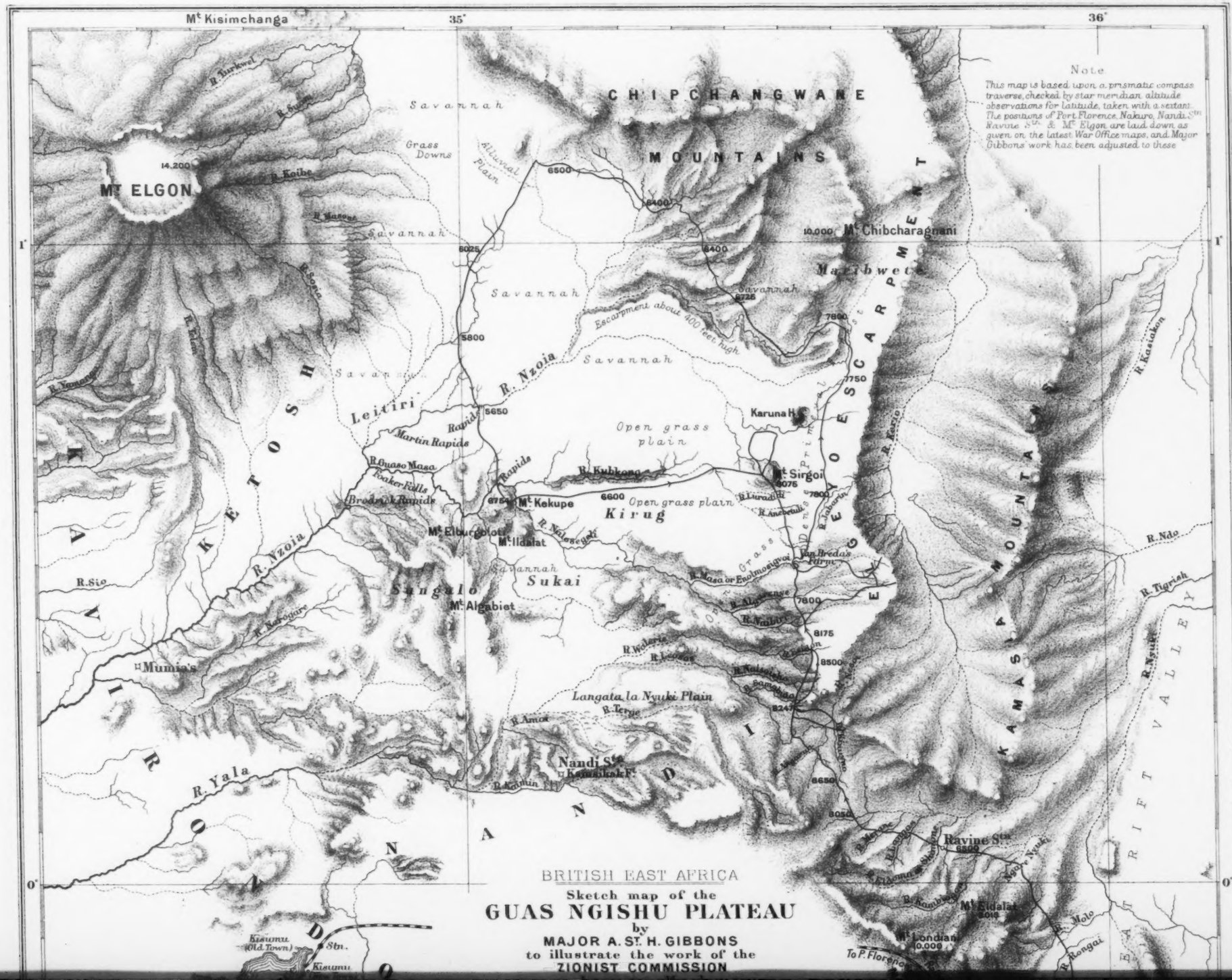


IWA ISLAND
N.W. & S.E.

KITAVA ISLAND
North

Feet
600
400
200
0

THE GEOGRAPHICAL JOURNAL, 1906.



BRITISH EAST AFRICA

Sketch map of the

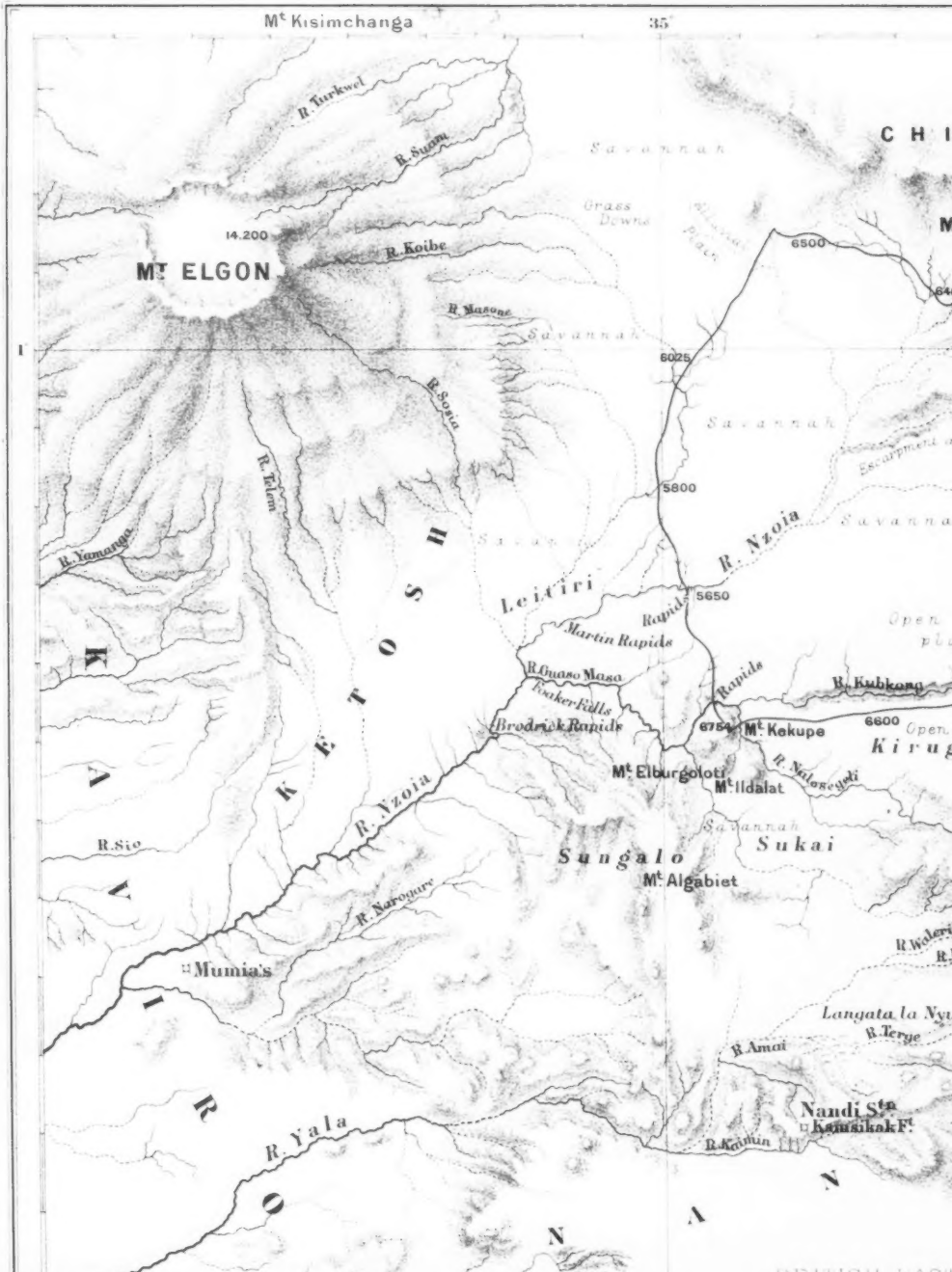
GUAS NGISHU PLATEAU

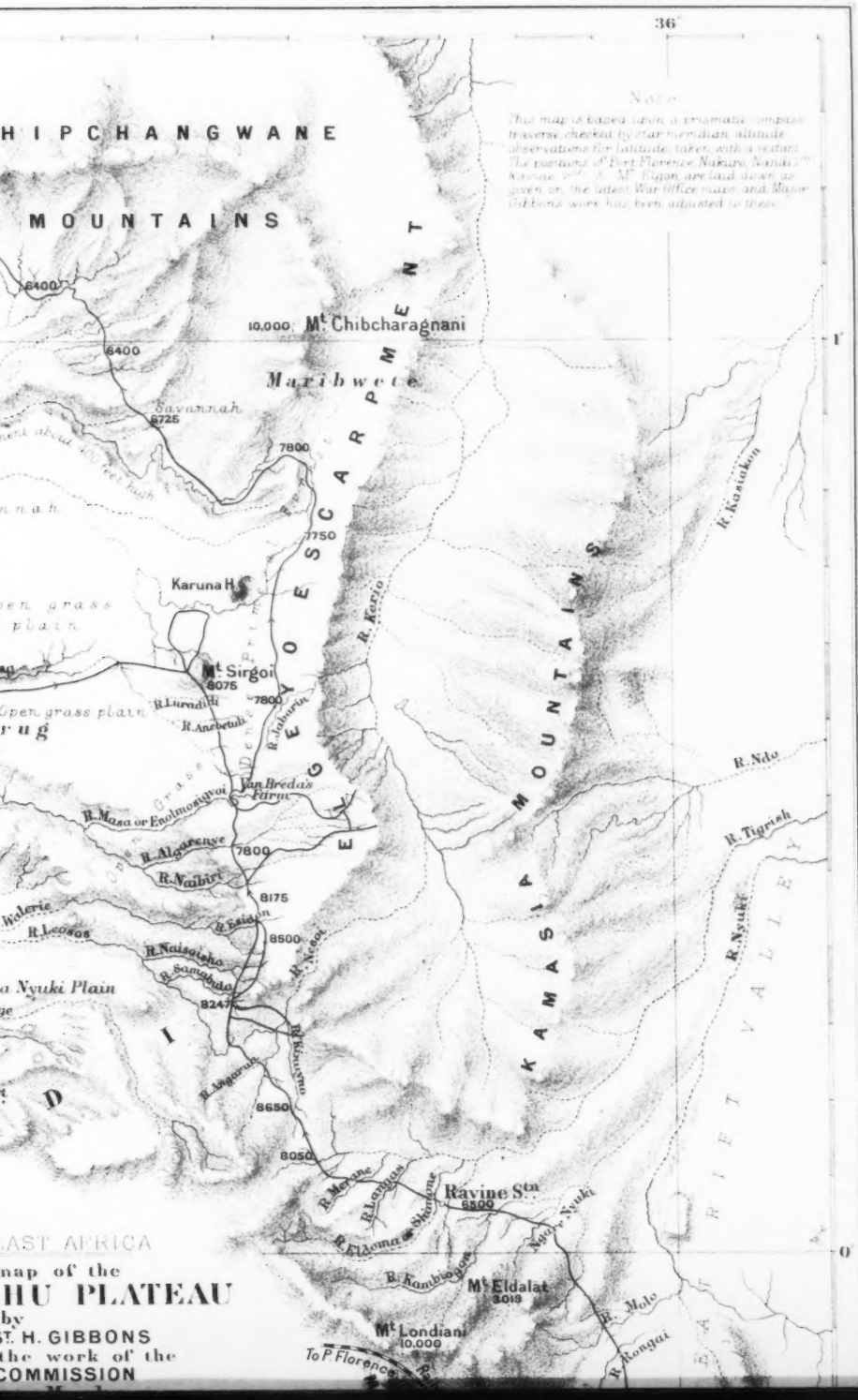
by

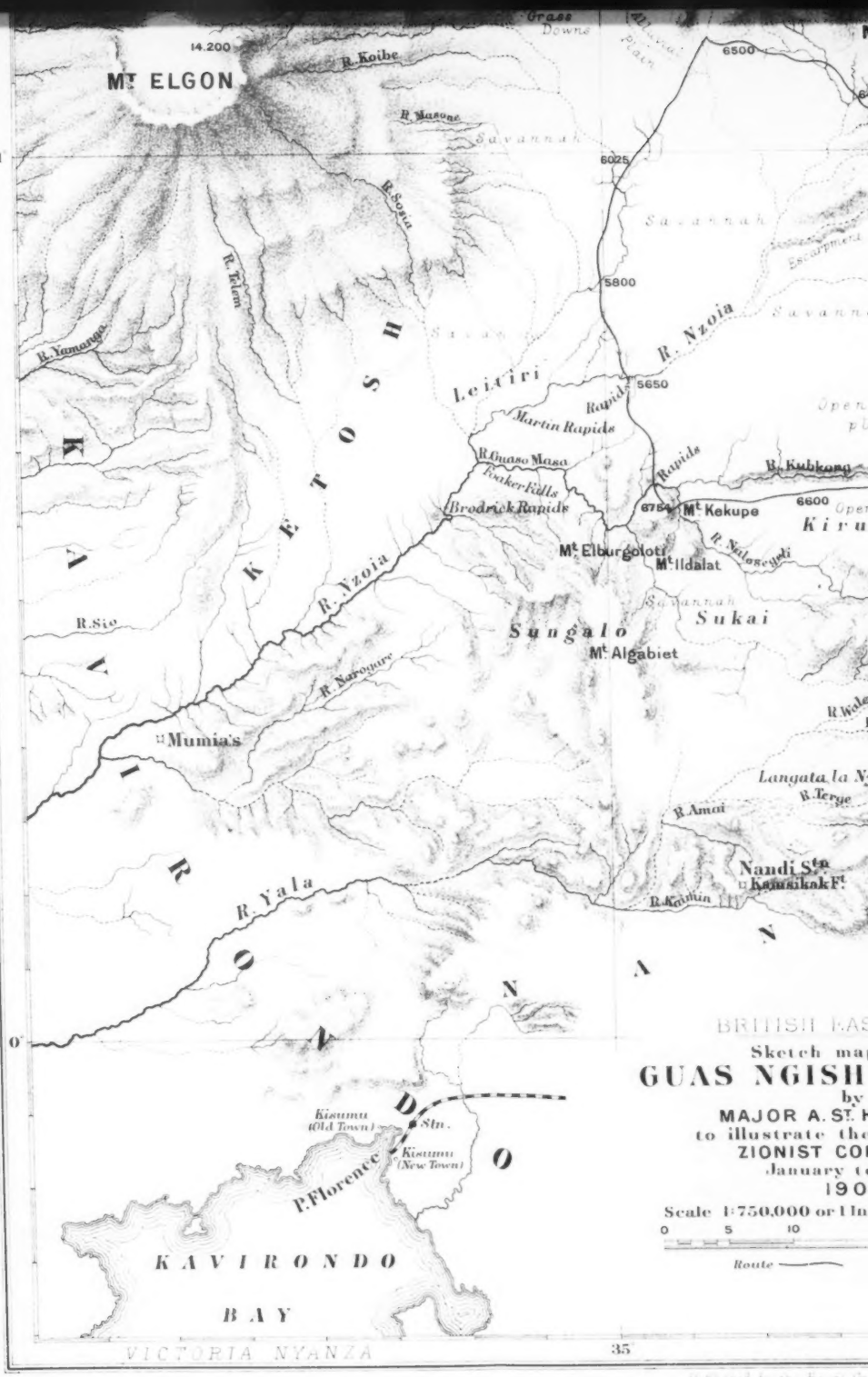
MAJOR A. ST. H. GIBBONS

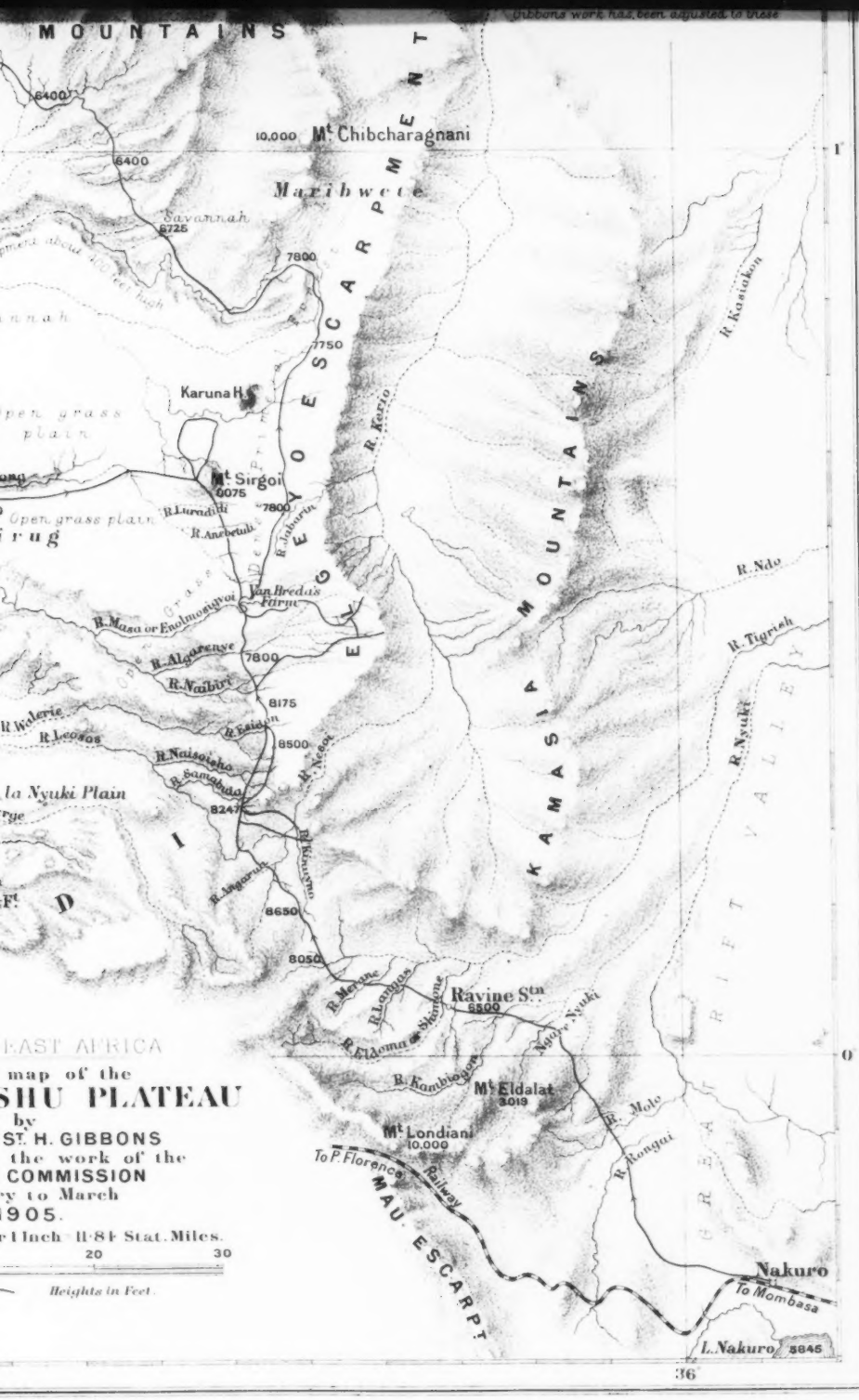
to illustrate the work of the

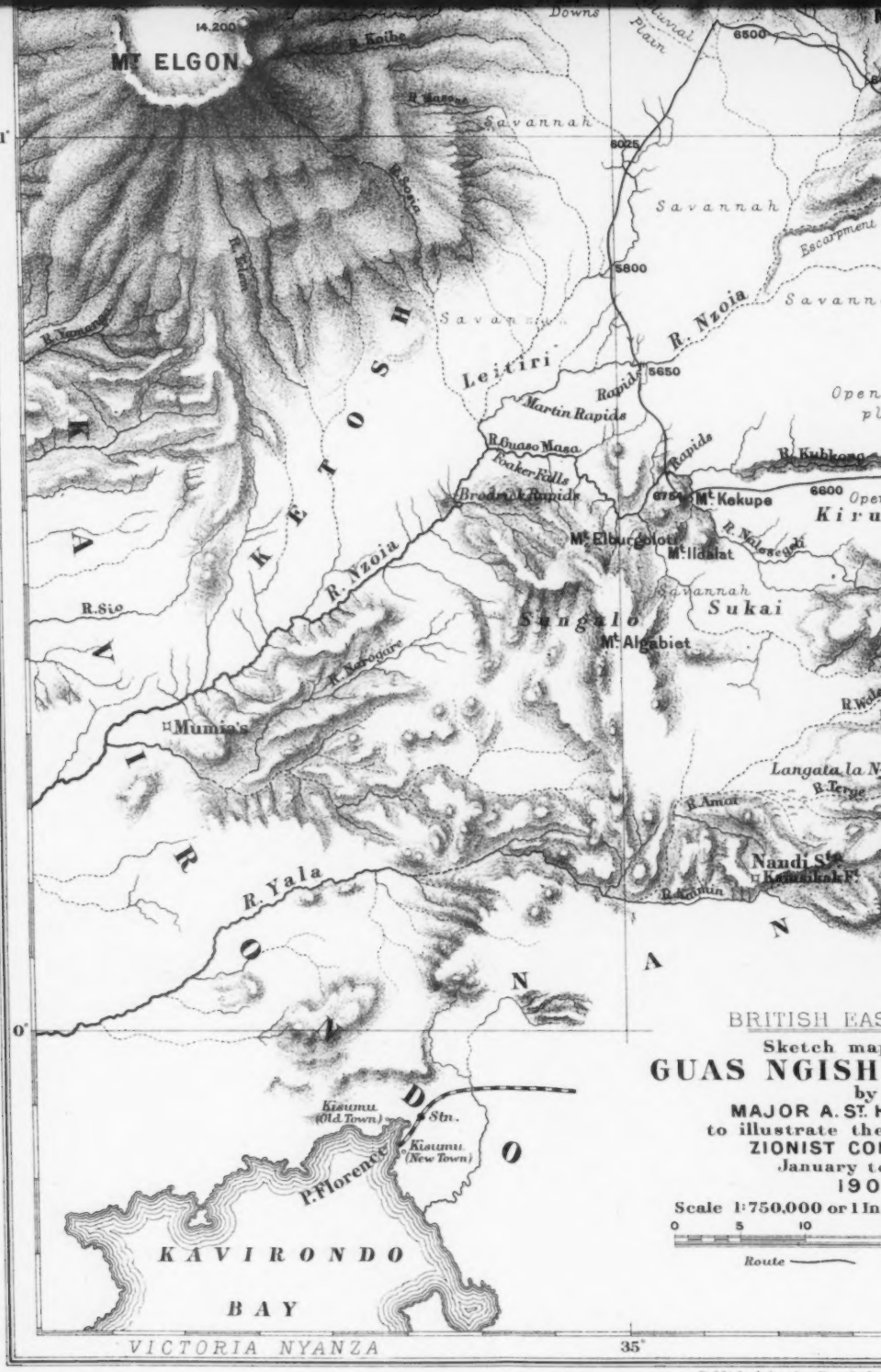
ZIONIST COMMISSION


Mt Kisimchanga
35
R. Turkwel
R. Suam
Savannah
Grass Downs
Plain
CHI
14.200
Mt ELGON
R. Koibe
6500
R. Masone
Savannah
1
6025
R. Sosua
Savannah
R. Talem
5800
R. Yamanga
R. Nzoia
Savanna
Leitiri
5650
Rapid
Martin Rapids
Open pla
R. Guaso Masa
Rapids
R. Kubkong
Barker Falls
Brodrick Rapids
6754
Mt Kokupe
6600
Open
Kirug
Mt Elburgoloti
Mt Ildalat
R. Nalosegedi
R. Nzoia
R. Sio
Savannah
Sukai
Sungalo
Mt Algabiet
R. Narosura
R. Waleri
Mumias
Langata la Nyu
R. Terye
R. Amai
Nandi Stn
Kamasiak Ft
R. Kaimin
R. Yala
N
A
N
0
BRITISH EAST
Sketch map
GUAS NGISHU
by
MAJOR A. St. H.
to illustrate the
ZIONIST COM
Kisumu (Old Town)
Stn.
Kisumu (New Town)


36°
Note
This map is based upon a prismatic compass traverse checked by star meridian altitude observations for latitude, taken with a sextant. The positions of Port Florence, Nakuru, Naivasha, Mt. Elgon and Mt. Elgon are laid down as given on the latest War Office maps, and Major Gibbons' work has been adjusted to these.
HIPCHANGWANE
MOUNTAINS
6400
10,000 Mt. Chibcharagnani
6400
Mariwete
Savannah
8725
7800
7750
ESCARPMENT
Karuna H.
Mt. Sirgoi
8075
7800
R. Luradidi
R. Anderbuli
R. Laburin
R. Kario
Open grass plain
R. Masa or Enolmosyyoi
Van Bredas Farm
R. Algarsenye
7800
R. Naibiri
8175
R. Esiagin
8500
R. Naisoicho
R. Sambuda
8247
R. Ngarua
8650
8050
R. Merueue
R. Lambus
Ravine Stn.
6500
R. Elzoma or Sharpeni
R. Kombiogare
Mt. Eldalat
3019
Mt. Londiani
10,000
To P. Florence
R. Molo
R. Rongai
KAMASIA MOUNTAINS
R. Kasiakun
R. Ndo
R. Tigrish
R. Nyuki
RIFT VALLEY
Nyuki Plain
Valerie
R. Leosos
EAST AFRICA
map of the
HU PLATEAU
by
T. H. GIBBONS
the work of the
COMMISSION


14.200
Mt ELGON
R. Koibe
R. Masuge
R. Sogoa
R. Talem
R. Yamanga
Grass Downs
Alluvial Plain
6500
6025
5800
5650
Savannah
Escarpment
R. Nzoia
Leiviri
Rapids
Martin Rapids
R. Guaso Masa
Barker Falls
Brodrick Rapids
Rapids
R. Kubkong
6764
Mt Kekupe
6600
Mt Elburgolot
Mt Ildalat
R. Nalaregeli
KAVIRONDO
R. Nzoia
R. Sio
Sungalo
Sukai
Mt Algabiet
R. Sabogoire
Mumia's
R. Wale
Langata la N
R. Terge
R. Amai
Nandi Stn
Kamasiakek
R. Kaimlin
R. Yala
KAVIRONDO
BAY
Kisumu (Old Town)
Stn.
Kisumu (New Town)
P. Florence
VICTORIA NYANZA
35
BRITISH EAS
Sketch ma
GUAS NGISH
by
MAJOR A. ST. H
to illustrate the
ZIONIST CO
January t
190
Scale 1:750,000 or 1 In
0 5 10
Route


MOUNTAINS
6400
10,000 Mt Chibcharagnani
6400
Maribwete
Savannah
6725
7800
7750
Karuna H.S.
R. Kerio
R. Kasiakun
Mt Sirgoi
6075
7800
R. Luradidi
R. Amberuli
R. Laburin
R. Ndo
Van Bredas Farm
R. Masa or Enolmongwai
R. Algarenye
7800
R. Naibur
8175
R. Tigrish
R. Nyuki
R. Walerie
R. Leosos
R. Esiolin
8500
R. Neeor
R. Naisoicho
R. Samburra
8247
la Nyuki Plain
R. Kaurmo
R. Ungarus
8650
8050
R. Merime
R. Langas
Ravine Stn
5500
R. Eldoma Shimeng
Major Nyuki
R. Kambiogut
Mt Eldalat
3019
R. Molo
Mt Londiani
10,000
To P. Florence
Railway
R. Rongai
MAU ESCARPT
Nakuro
To Mombasa
L. Nakuro 5845
EAST AFRICA
map of the
SHU PLATEAU
by
ST. H. GIBBONS
the work of the
COMMISSION
y to March
1905.
1 Inch = 11·84 Stat. Miles.
20
30
Heights in Feet.
36



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Heights in Feet.

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